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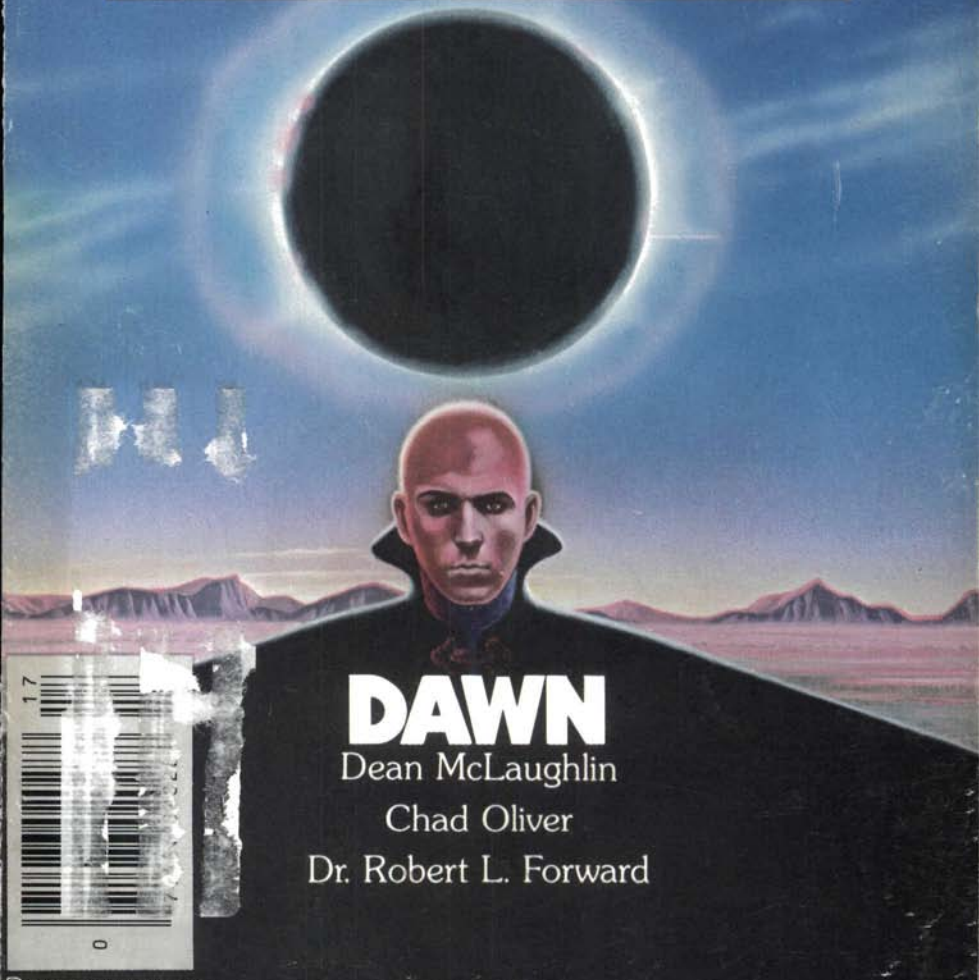

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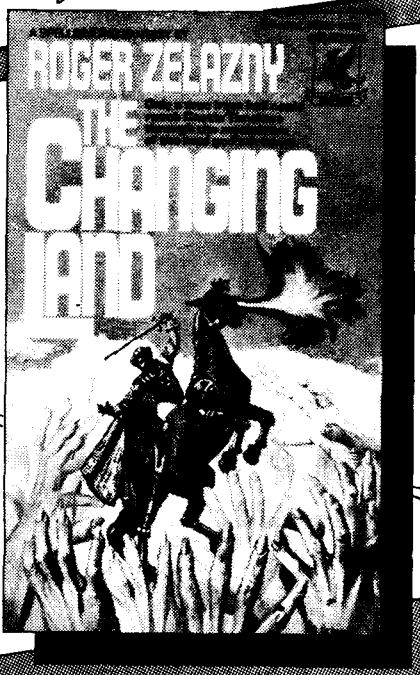

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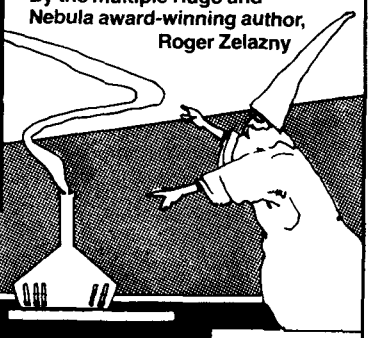

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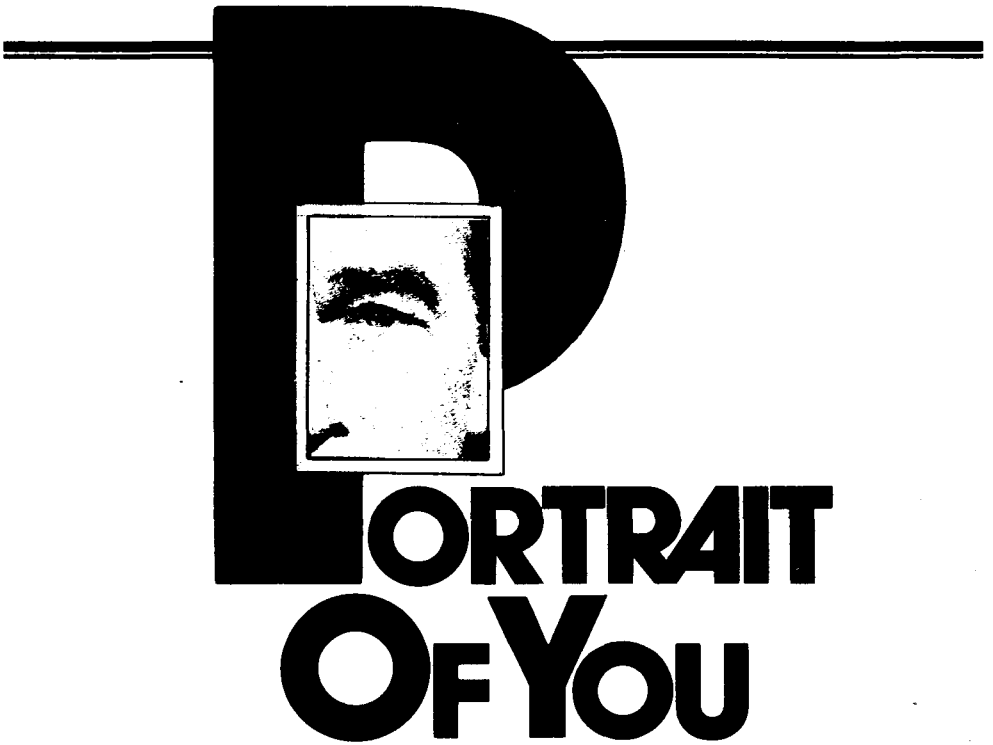

Editorial

Your response to the questionnaire in our August issue was gratifying, and it's time for us to return the favor by sharing the results with you. We've broken them down to yield what we think is a pretty good statistical portrait of you, the Analog readership. We have no delusions that it's *perfectly* representative, but you gave us a good sample and it's unlikely that any of the numbers would change very much if we were able to get answers from every one of you.

To me, the results were heartening in two special ways. First, they confirm my belief that I have a pretty good feel for who you are—I couldn't have predicted the exact numbers, but virtually all of the major trends are quite close to my expectations (and what I've been telling top management). Second, they confirm that you are still—as I thought—one of the most select audiences any magazine can claim.

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Let's summarize the results by running down the questionnaire; I regret that I can't share the vast range of illuminating comments you added to your basic answers.

1. *Are you male or female?*

75.1% of the respondents were male, 24.9% female.

2. *Are you single, married, or other?*

Here we'd better start using tables; the numbers in the body are percentages unless otherwise noted.

	Total	*Male*	*Female*
Single	41.8	41.3	43.6
Married	51.2	53.2	45.2
Other	7.0	5.5	11.3

3. *Highest level of education attained*:

	Total	*Male*	*Female*
Attending grade school	0.1	0.2	0.0
Attending (or attended) high school	4.5	5.0	2.7
Graduated high school	6.1	5.6	7.5
Attended college	20.3	19.5	22.6
Graduated college	23.5	21.3	30.1
Took graduate studies	16.5	17.9	12.4
Have master's degree	18.4	19.0	16.7
Have doctorate	11.4	12.4	8.1

These figures reflect an unusually well educated readership. About 70% of you are college graduates and 30% have at least one graduate degree. Many of the rest of you either are on your way to a degree or have demonstrably done a good job of educating yourselves.

4. *If you attended or are attending college, what was or is your major?*

Virtually every conceivable major appeared among your answers; some of you had more than one. A few of the more frequent ones are listed here, together with the percentages reporting them.

Among men, 48.9% reported engineering or one of the "hard" sciences such as physics, chemistry, astronomy, or biology; 7.3% business administration; 4.8% social sciences such as anthropology, sociology, or economics; 3.7% psychology; and 2.5% history.

Among women, 35.5% reported engineering or hard sciences; 13.4% liberal

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arts; 8.6% education; 8.1% psychology; 6.4% fine arts; and 5.4% nursing or other health professions.

5. *Your total annual household income before taxes*:

	Total	*Male*	*Female*
$50,000 and up	11.0	11.2	10.2
$30,000 to $49,999	26.6	29.9	16.7
$20,000 to $29,999	25.9	25.7	26.3
$15,000 to $19,999	12.9	12.1	15.0
$10,000 to $14,999	11.0	8.9	17.2
$7000 to $9999	3.8	2.5	7.5
Under $7000	8.9	9.6	7.0

About 38% of you have incomes above $30,000 and 63% above $20,000—a fact which should attract the attention of advertisers (and hence revenue to sustain and improve the magazine).

6. *Your age*:

	Total	*Male*	*Female*
Under 18	2.4	2.5	2.2
18-24	12.2	13.1	9.7
25-34	33.9	31.4	41.4
35-49	25.4	24.9	26.9
50-64	19.8	21.3	15.0
65 and up	6.3	6.8	4.8

7. *If employed, what is your major job function?*

As with college majors, the diversity of answers was impressive. We heard from government officials (some calling themselves "bureaucrats"), prison inmates, archeologists, janitors, cowboys, aerospace designers, chefs, judges, truck drivers, cyclotron operators, dog trainers, technical journal editors, and clergymen (at least one of whom added that he gets the inspiration for several sermons a year from our pages). And that list is far from exhaustive.

Among men, some of the more frequent categories were: Management (14.8%), technician (8.5%), computer science (8.2%), education (7.3%), engineering (6.6%), research and development (5.9%), office/clerical (5.0%); 3.4% were students and 6.9% retired. (Some 30% of these jobs are in clearly scientific or technological professions and quite a few of the others, including many at managerial level, are probably at least peripherally so.)

Among women: Office/clerical (19.4%), education (12.4%), management (11.3%), nursing and health (7.0%).

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8. *What does your company make or do?*

	Total	*Male*	*Female*
Agriculture, forestry	0.6	0.8	0.0
Construction	1.7	1.5	2.2
Manufacturing	6.9	8.2	3.3
Transportation, communication, and public utilities	7.6	7.8	7.1
Wholesale and retail trade	3.2	2.1	6.6
Finance, insurance, and real estate	6.2	5.9	7.1
Services	13.3	12.9	14.3
Education	11.2	9.5	15.9
Armed forces	4.7	5.7	1.6
Research and development	5.6	6.8	2.2
Government	6.2	7.0	3.8
Miscellaneous industry	9.5	9.5	9.3
Computer services	7.3	7.6	6.6
Self-employed	1.0	0.6	2.2
Unemployed (including students, housewives, and retired)	15.4	14.6	17.6

9. *How long have you been reading Astounding and/or Analog?*

	Total	*Male*	*Female*
One year or less	4.8	4.7	4.8
2-5 years	16.4	15.2	19.9
6-10	21.9	22.1	21.5
11-15	13.2	13.0	14.0
16-25	15.4	13.9	19.9
26-35	12.3	11.7	15.0
36-50	15.8	19.5	4.8

10. *Which features of the magazine do you like best?*

On this one we had a few minor problems. We asked you to rank the major parts of the magazine "in decreasing order of preference," i.e., your usual favorite should be marked "1" and your least favorite "8." A few of you apparently interpreted this oppositely; when it was clear from your added comments that this had happened, we adjusted accordingly. When we suspected it but weren't sure, we had to disregard your ballot on this question, so the figures given are based

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on a very slightly reduced sample. (We apologize for any ambiguity in our wording of the question.) Also, some of you got carried away and embellished your ranking system a bit. We appreciate your enthusiasm when you say, "All parts are #1," and we get the message when your rankings run, "1, 2, 3, 4, 9.4×10^{27} . . . "—but when we're compiling the results on a programmed calculator, it's a little hard to figure out what to *do* with such answers.

Even so, the results are pretty clear. The features are listed here in order of your overall preference—most popular first. The numbers in the table are the average place ranking given to each feature by the members of the indicated group.

	Total	*Male*	*Female*
Novelettes	2.13	2.15	2.08
Short stories	2.53	2.65	2.18
Serials	3.23	3.21	3.29
Editorials	4.39	4.41	4.32
Science fact articles	4.62	4.41	5.24
The Reference Library	5.43	5.57	5.00
The Alternate View	5.58	5.55	5.68
State of the Art	6.48	6.49	6.44

The order of rankings by male and female readers are almost identical, differing only in the exact order of the nonfiction items in the middle of the list. You seem agreed that you want Analog to be a magazine primarily of fiction and secondarily of fact and opinion—and primarily *of*, rather than *about*, science fiction.

11. *What other science fiction, science, and related magazines do you read?*

Nine percent of you said you read *no* other magazines, but the rest indicated a great volume and diversity of outside reading. Fully 44% of you read *Scientific American*, 43% *Isaac Asimov's Science Fiction Magazine*, 40% *Omni*, 39% *The Magazine of Fantasy and Science Fiction*, 27% *Galaxy*, and 13% *Galileo*. Since those figures alone add up to 215%, it's clear that most of you read several—and the complete list of magazines mentioned is much longer.

12. *What book clubs do you belong to?*

36% listed the Science Fiction Book Club and 5% the Book-of-the-Month Club. 44% belong to no book clubs—but this does not mean you don't read books.

The last time a survey like this was done and published seems to be more than twenty years ago; if you want to compare, you'll find those results on p. 135 of the May 1958 issue. In most respects, they haven't changed very much. Such changes as do stand out can mostly be described as, "You're the same kind of

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Mystery Lovers—Can You Solve This?

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folks, only even more so." In 1958, John Campbell wrote, "The median reader appears to be about thirty years old, male, a college graduate in one of the engineering sciences, making about eight thousand dollars a year, who's been reading *Astounding* since about his sophomore year in college, currently employed in manufacturing industry. . . . It's obvious that we have an abnormally high-level readership, over one fifth of them in the over-10,000-a-year income group. . . ."

The main changes I see in looking over the new and old figures are these:

1. The percentage of female readers is up from about 12% to 25%.
2. The median age is now closer to thirty-five, with relatively more older readers and fewer younger ones.
3. The educational level is even higher now than then. This, presumably, is partly a reflection of the general rise in educational levels—but I suspect it's also a reflection of something else which I'll mention shortly.
4. Your income levels are still higher—even, I think, after correction for inflation. $10,000 was a good deal of money in 1957, but not as much as $35,000 today.
5. College majors and occupations are generally pretty much as they were, with a large variety but the heaviest concentration in technical professions. One category, manufacturing, is way down—from 35.8% to 6.9%. I'm not sure exactly what this signifies—but it probably has something to do with the facts that "Miscellaneous industry" is up from 0.9% to 9.5%, and we've added a new category, computer services (an effect of real technological change!), which now contains 7.3% of you.

Several of these changes—the rise in educational level and income; the increase in older readers and those who've been reading this magazine for very long times; and what I see as an underrepresentation of young, new, and student readers—seem

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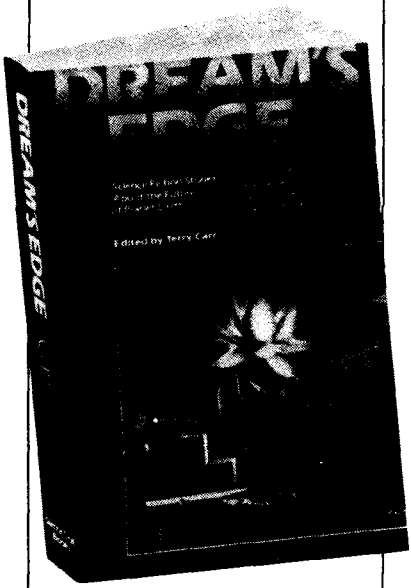
—Terry Carr



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tied to the fact that we have an unusually high percentage of very loyal readers who latch onto the magazine and never let go. This, of course, is gratifying—but these facts also suggest that we have not been working hard enough to call Analog to the attention of young people and students (who I know include far more potential readers than we've been reaching). Previous editors and I tried hard and with limited success to convince previous publishers of this; now we have hard data to support it—and a publisher who is actively interested in doing something about it. Here is an immediate way in which your cooperation has *already helped us to help you—for you* who are already reading Analog need a continuous influx of new readers to keep your magazine solidly supported.

So—thanks again! ■

● Science itself is a humanist in the sense that it doesn't discriminate between human beings, but it is also morally neutral. It is no better or worse than the ethos with and for which it is used.

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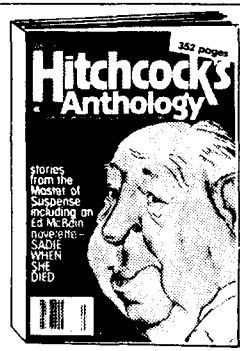
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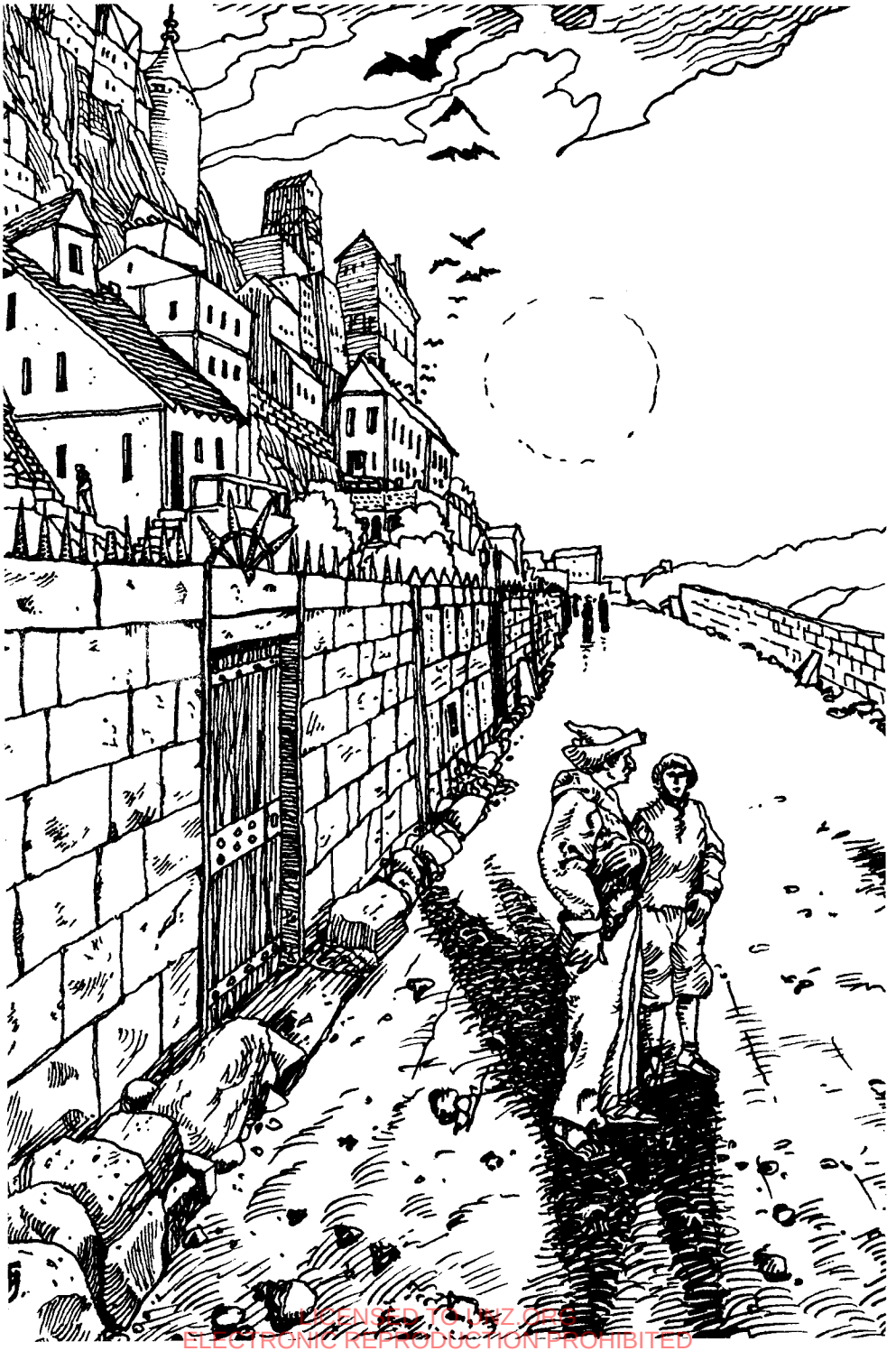

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Part One of Four Parts

Dean McLaughlin

DAWN

It might seem that people
would appreciate being warned of things to come.
Prophets know better—
though the learning may be hard.

Jack
Gaughan

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Part One

And here upon earth's noonward height
To feel the always coming on
The always rising of the night.
—Archibald MacLeish

"Would our gods desert us?"

Isak kept his hands clasped behind him, where only the Audience Chamber's deaf-mute doorkeepers could see how his fingers twisted each other. To the Council of Brothers he let himself give no sign of his unease. He'd spoken truth and only truth, he told himself; therefore, he should fear nothing. These men—of all who served the gods the most wise—would surely know truth when it was told to them. Yet he had seen them scowl as he spoke, this Council of Brothers—had seen one drop his double chin onto his paunch and doze, while another stared gap-mouthed and vacant at the high mullioned window across from him. Perhaps that one heard what Isak said, though he had never looked his way; but had those others? Did they understand how he had come to his strange knowledge?

They'd been not at all as he'd imagined: ancient men, all of them, their faces jowled and seamed. The table at which they sat, six on a side, had once been black marble polished to a glossy sheen; now it was dull and scarred. The man nearest him on his right had crooked yellow teeth, the one on his left had none at all. At the far end, hands clasped over a grotesquely bloated belly, slouched Sedmon, Brother of All. Only a single curl of grey hair showed under the up-tilted brim of his plain priest's tricorn. He was too distant for expressions to be clear on that almost fleshless face, but Isak had seen the same wary look in the eyes of trapped voles as, frightened and in pain, they sought escape from a menace they did not comprehend.

Isak shifted his weight from one foot to the other.

"Well?" It was the same one who had spoken before, the one midway down the table on the left. A puckered scar traced a ragged signature above his eye. A dark gap showed where one of his fangteeth had been. Isak flinched as if stung. He'd hoped the question had been rhetorical.

He found his tongue. "I do not claim to know what the gods would do," he said, doing his best to keep the tremor out of his voice, "nor what they would not do. As you must know, I am only a scribe, not worthy of the honor of standing in your presence. But I come to you by referral of the heirophant in whose shrine I serve. I have told you my studies have given me knowledge that our world shall suffer a time of darkness. Knowing that, should I tell no man?"

"You claim to have no understanding of our gods," said Balchin, the Legate Priest who stood behind Sedmon's right shoulder. Above him a sunburst had been incised and gilded in the grey, speckled granite of the wall. Like an eye, it seemed to watch. The priest's voice carried challenge. "Yet you say," he went on, "that all shall leave our sky. So! Your own tongue betrays your true belief."

The reference to his tongue gave Isak a quick chill. "No! That is not the way

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of it," he protested. "I beg you to understand. I say nothing of their purpose. I say only that if they do not break the pattern of their motions across our sky, within the limits of how I have come to understand that pattern, they will permit to happen this one thing."

Isak saw scowls and frowns. He saw two heads lean close together to exchange a muttered comment. One Brother lifted a hand to the base of his throat to touch the torque of his office, as if to make sure it was still there. The Legate Priest bent down to speak and then to listen to the Brother who sat by Sedmon's left hand. His eyes stayed on Isak as if watching the bones inside his flesh.

"This prophecy—" A precise, insinuous voice came from midway down the table; a purse-mouthed man whose tricorn with a red cockade was pushed back to expose a naked, scaly scalp on which blue veins traced twisted courses. "This prophecy—did it come in a dream? A vision? Did it come unbidden to your tongue?"

Asked with a different inflection those questions might have been a sign of sympathy, an attempt to understand. But asked thus, in sarcastic challenge, they gave Isak the feeling he had somehow, all unknowing, committed a terrible offense. Only the certainty that he had not kept Isak from retreating to the door, recanting all he'd said, and taking flight. But he had spoken truth, and he served the gods. Somewhere he found the strength to speak again.

"None of those, respected Brother. Given the knowledge with which I began, and with the wit to think about what will come as consequence, any man would foresee what I have foreseen. It is no more miraculous than arithmetic."

"No inspiration whatsoever?" Now the tone was pure disbelief.

"None, good Brother." He felt as if, with that admission, he had lost his last hope of convincing them. He swallowed; it did nothing to relax the clenching hurt in his throat. "Is it so terrible to seek a better understanding of the gods? Must it be only what comes unsought to our minds?"

"How else can we be sure it comes from our gods?" Balchin demanded. Stentorian, his voice filled the Audience Chamber like the stroke of a deep-throated bell. His jowls burned crimson.

"Can there be no other way of knowing?" Isak wondered.

Sedmon laid a hand flat on the table. It was all dry skin and grey bones. "It is we who ask questions, scribe."

Was that his error? "I am sorry, respected Brother," Isak said quickly. His lips felt numb. Did they not know truth when it was spoken? "I did not mean . . ."

Balchin drew himself to his full height. His body seemed to swell inside his vestment. The jewelled scapulum of his torque rose against his chest as if afloat on air. "What you meant means less than nothing," he said.

"Enough," Sedmon said. He lifted a hand. His voice had been soft, almost a whisper, but it brought instant stillness. He glanced around. "Dissent?"

"None." A Brother brushed at food stains on his vestment's brocade. Another scratched his armpit and turned grey brows to the table's head. "No

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reason to hear any more such preposterous babble."

The one who had stared through the window while Isak explained his discoveries stirred himself. "Aye. Enough." With folded arms he slouched down. His torque was almost buried in the globe of fat under his jaw. His gaze went again to the realm of the gods.

Isak felt cold sweat trickle from under his arms. On either side of the Chamber, higher than the top of his head, open windows pierced the stone walls. Behind the Brother who had just spoken, one of the gods—it would be Blazing Alpher, Isak thought—cast his light on the floor, while Actinic Gamow, now standing high, shone on the sills of the western side. How could they watch, Isak wondered, and permit such things to happen?

Silent as ever, the gods did not explain.

"We thank you, scribe, for entertaining us with your strange . . ." Sedmon paused, then twisted the word " . . . your prophecy. Go. Your heirophant waits." His eyes were set deep in his skull. Dark, tiny eyes. Lifting his fist, he opened it, and with the open hand made a formal warding gesture. "Submit yourself to his guidance. Pray that our gods shall be merciful."

One of the doorkeepers came up behind and took Isak's arm.

"I give thanks to my Brothers." Isak said. His voice trembled and his knees were not steady. "For hearing me." With his free hand he touched his forehead above the left eye. The doorkeeper led him away.

* * *

It does not pay a prophet to be too specific.

—L. Sprague de Camp

The doorkeeper thrust Isak out into the access hall and, retreating back into the Audience Chamber, hurled the door shut with a force that sent thunder to the top of the Temple's tower and down to its foot. By then Artaneel had risen from the bench. His sandals whispered on the stones. Taller than Isak, he peered down at Isak's face with eyes that were not as good as they had once been. Nevertheless, they saw enough. With a grimace of distaste and a heavy sigh, but without a word, he led Isak away.

The stone stairs downward had been hollow-scalloped by millions of feet and great reaches of time. Small apertures gave illumination from outside, but much of the descent was in dim light. Several times Isak had to slow his pace and pick his way. Artaneel clung to his sleeve. When the stairway's spiral took it down within the Temple's body, only burnished metal reflectors that splashed pale light from higher up downward against the walls made it possible to see at all. He wondered how it would be when the darkness came. Like blindness, he thought with a catch in his breath, and he thought of the massive panic such a blindness, suddenly suffered by all, would cause. People had to be told it would happen, had to know it was a thing they need not fear. His mouth was as dry as desert stone.

The stairway came down into a cramped, barren gallery which gave entrance through a narrow doorway into the chancel of the Temple's great hall.

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All the shutters were open and the hall was full of light and the gods' glory. Gold fittings gleamed. Jewels glittered. Fine carpets seemed to glow with inner flame. Isak found that he could breathe again.

There they had to pause while a troupe of pilgrims filed past into the hall, softly singing as they strode a hymn of honor to the gods. By their garb they had come a long way. Their capes and cross-gartered leggings were of a style Isak had not seen since his wanderings had taken him into the watershed of the East Sea.

Not many came from so far at this season, for it meant a crossing of the Middle Mountains before the storms ended and of the desert after the heat began. It meant, also, a similar ordeal for the return. Only great dedication or terrible need could have caused them to undertake such a journey. The skin of their faces had a too-smooth look, like hide stretched over the mouth of a drum. It told of privations along the way.

But now their faces wore expressions of pride. They had come to the Temple. One of them limped. Another hobbled on a crutch; his foot was withered and his leg was oddly bent. An acolyte struck a gong and brasses brayed a fanfare. Their hymn rose exultant, filling the cavernous space. For a moment Isak watched as they advanced down the nave and hoped for their sake that the gods would give their mission more success than he himself had been allowed. His tongue tasted metal and dust. At last Artaneel touched his arm. Their way was open now.

They stepped out into the light of the gods. Isak looked skyward. There Blazing Alpher stood high in the east; Actinic Gamow, having passed his zenith point, was already descending to westward. All as he'd known they would be. More difficult to find was the Pale One, but at last he found her among the clouds that clustered low above the grey, dark, humpbacked shapes of the Defender Mountains. White like a cloud herself, only her perfect roundness and the faint stripes across her face gave her away.

Only when he was sure the gods were where they belonged did he look out across the square. It was a broad expanse of fitted stones where nothing grew except the Obelisk's tall spire; the Obelisk that was, so the priests claimed, the center of the world. In truth, Isak knew it was not, though if he were asked where the center truly was he could not have said. That no man knew. Even from this distance and from this low angle, curved lines and marker spots of other-colored stones made reading how its shadows lay almost effortless to a knowing eye—its Alpher shadow moderately long and pointing northwest, its Gamow shadow at medium length and aimed aslant across the square, northeast toward the threshold of the Great East Road. Yes, exactly as they should, with the Pale One newly aloft.

"As you expected?" Artaneel asked.

It brought him back. "The gods?" He nodded toward the Obelisk. "Yes. The Brothers—?" His voice broke. It was like pain. "I do not understand them."

A breeze touched his tunic as they started down the steps. It was dry and

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tasted of sand. Through the braided rope of his sandals he felt the scatter of grit on the stone treads. It had been dry all summer. There was talk that the barley crop had failed except in fields near the river, and that other crops had yielded less than their normal abundance. Down in the city the merchants had begun to ask more for even the most plentiful foods. There was grumbling and some were openly asking how the gods could permit it to happen. Isak, whose wanderings had taken him more than once to places of far worse famine, and who had heard tales of still other places and times, had no answer for them. None he could trust. Possibly it was merely that it made no difference to the gods. A fearful thought; his mind cringed from it. But he could think of no more sophisticated reason.

He told himself that it was his own deficiency; the gods did what they did for reasons of their own, which men could not hope to understand. But that too left him dissatisfied. He let the question be asked. He said nothing.

"Did I not warn you, Isak?" his heirophant asked. "Did I not say they would be skeptical?"

The stones of the square were well laid, affording a level pavement to their feet. They set off toward where the Great Way entered, off-center, beside the massive stone bulk of the Archives. A file of petitioners in tradesmen's smocks, flanked by an amply robed priest and a bell-shaking acolyte, came toward them on an opposite course. Near the Obelisk another priest paced the stones. A gaggle of off-duty acolytes, their cloak clasps loosed, drifted toward the gate on the square's western side; beyond the wall the tiled roof of their refectory burned under Alpher's strong light.

"I disbelieved it myself," Isak said, "when I saw how the paths would come together. And it is such a strange thing to happen. But they would not even think about it. They thought it was not possible. As if it could not happen if they did not believe."

"It is said they know our gods," Artaneel reminded him.

Isak trudged across the stones. Feet and time had worn them smooth. Where the tip of the Obelisk's Alpher shadow came down, a Guards' candidate lay face down, naked, arms outsprawled, while a mumbling, wall-eyed priest inflicted scars of honor under and between his shoulder blades with a black glass shard. Clutching the stones, flinching at each stroke of the cutting edge, still he uttered no sound. His back was a mass of graven flesh. Blood trickled on the stones. Isak's own back felt each gash as the priest inflicted it. Impassive, a group of Guards looked on.

Dumb, obedient to his heirophant's nudge, Isak detoured around. They passed through the shadow and he felt for a moment the relative coolness of its shade. Gamow's light, though, stayed on them. The priest who had been pacing near the Obelisk strolled off toward the looming facade of priests' apartments that bounded the square's east flank. Artaneel's sandals briskly slapped the stones as he walked.

"You did poorly," he said. "Isak, you did poorly."

"I know, respected heirophant," Isak said. "But should I not have tried to tell them?"

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Another small procession emerged from the Great Way. Stout and sour-faced, a bridesmarket matron conducted her charges with a stern eye and frequent behests that they comport themselves in a more ladylike manner. The girls, in fine long skirts and shawls, with lace caps on their heads, skipped along and babbled effervescently among themselves. Their maidens' chains clinked like tiny bells.

At sight of them, Isak's stride faltered. For them this was the most exciting time of their lives; within a few passings of the gods, their suitors would contest for them at the auctions, and they would have the delicate and careful pleasure of deciding which swain's bride-price they would accept. A happy time, Isak thought, for young girls, and for young men who had the wealth, the household, and the presence to hope their offers might be welcome. For himself, who now could hope for none of that . . .

"I had hoped they would be wise," Isak said. "They are said to be wise. They are said to know truth when it is told them."

Artaneel said nothing. He stalked across the stones, his mouth compressed to an annoyed grimace. He did not look in Isak's direction.

From the point where the Great Way entered the square, traffic diverged. Most, both priest and citizen, were going to the Temple, but some turned to enter the Archives and others headed for the priests' apartments. One compact group, outfitted for travel, oroxmounted and leading bulky-laden pack drome, aimed directly for the corner of the Temple where the West Road began. Almost without knowing, Isak gave them the wayfarer's sign. They returned it. He felt a touch of envy for them; even the road could be thought of as one's own place—a place with as much honor as any other—for those who journeyed endlessly. Their world, though, had no place for a scribe. Looking back over his shoulder, Isak watched them go.

Artaneel had to nudge him, had to break the thread of his thoughts and turn him to the path of the Great Way. It extended before them, straight and broad and—each fifty paces—watched by statues. Tricorned priests, most of them, facing each other across the pavement. Seated, most of them, with lens and mirror in hand or in their laps; a few stood in postures of succor, beneficence, or instruction. They seemed to guard the high walls at their backs; walls beyond which nothing could be seen but an occasional frond or slope of roof tile. As if it was a different world on the other side; but only the highest priests would know the truth of that. Isak wondered, not for the first time, what truth was. Somewhere he thought he heard a girl's pure laugh.

"Did you think they would reward you?" Artaneel asked. The sharpness of his voice stung.

"I had hoped at least they would honor me," Isak said. He still couldn't understand. He had brought them a foretelling of terrible importance, yet they had not welcomed it. Was it possible they did not welcome truth?

The Great Way stretched on. They paced its length, Isak in his bewilderment, Artaneel in his chilly rage. At last they passed under the gateway arch; on

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either side Guards lounged, two on each side, swords in scabbards and pikes within easy reach. One gnawed a sausage. They watched the passers-by with the dull neutrality of men who had nothing to do.

From the plaza outside the gate they could see the city. The smoke of many fires filled the valley with haze and shadows. The river curved through the mass of crowded buildings like a silvered path for giants. Barges, sailcraft, and skiffs dotted its surface. Piers jutted like snaggled teeth. On either shore, warehouses, fitters' yards, livestock pens, and wagon docks squeezed side by side like voles at a desert seep, while farther from the river, cracklike clefts of narrow streets twisted through the throng of tenements, shops, and the massive, hulking shapes of the guildhalls. It was said there were places down there that the light of the gods never touched; Isak thought it very likely. Only the awnings of market squares and the green of the public baths' garden gave color to the jumbled mass. Grey plumes of smoke trailed slowly windward. So many places. Each was someone's own.

"If they had given me honor, my skills would have been proved," Isak said. "I could achieve a place that was my own."

"Humph," Artaneel said.

Isak gave the city one more wistful gaze. Above the tenements, the villas of the gentry—those of wealth or privilege or both—clung to the slopes. Up from the valley floor they lifted, stairstep and terrace, irregular reach upon reach, in zigzag upward quest. Like aspiration. And, on the far side's crest, glowering over all below from its narrow headland, the old dark castle whose ruined wall, deeply broached in a dozen places, dribbled its rubble down the face of the cliff below its footings. Citadel Lagash. Isak thought of shattered hope.

They did not linger. From the plaza two streets led down; one eastward, one west, each trailing across the face of the slope until turned back by the deep empty void of a ravine. The westward one, the Avenue of the Acolytes, was the one less travelled, for it did not lead toward the city's central parts and was the sharper climb, but it was not as far that way to the Shrine of the Narrow Streets District. As heirophant, Artaneel had to be at his shrine in time for the observances of the Twinned Ones' rising and for Gamow's set. Isak wanted to be there also, to mark those moments on his charts. In spite of disappointment, his research would go on. As soon as they were under the brow of the bluff, the villas began.

"When you came to me," Artaneel said, "I told you that to go with it to the Brothers would not be wise. You know as well as I the peril in which a prophet stands. You insisted."

"I thought they would want to know," Isak said. "I thought it was important they should know. And it was only a foretelling."

"And when they summoned you, I warned you they would see it as a prophecy. I offered you protection —offered even to tell them it was all a mistake. But you insisted."

"I thought if I could explain to them, they would see that I spoke truth," Isak said. "Even if they hadn't before."

"If you thought that, you are a brash

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young fool," Artaneel said. "To say that our gods dance a pattern that is known and changeless implies things which are heretical. Your foretelling may be proved correct or wrong—I do not know—but I know this: the Brothers would not hear with open ears a prophecy attained by no more revelation than the plodding step-by-step by which you say it came. Events so radical should come with portents of commensurate power."

"But I told them truth," Isak protested.

"When you speak of our gods, it is the Brothers who decide what is truth," Artaneel said and, with a slash of his hand, dismissed the argument that quivered on Isak's tongue. "I've done all I could to protect you. I've even let them know the foretellings you've produced for me have been uncommonly reliable. But I can do no more, and they will do what they will do. The only sign of hope I see is that they permitted you to leave their presence. Putative prophets have been known to enter their chamber and not be seen ever again. Feeding the eels, no doubt."

Now they walked between high walls again; gated walls on the street's uphill side, over which the roofs of villas could be glimpsed, while on the downhill side the walls were blank-faced bastions. The homes they guarded stood too low on the slope to be seen, and their street gates would be on the next level down. Filth littered the stones; there had been no rain for more than twenty passings. Insects were a squirming skin on the choicer bits.

Climbing toward them, a four-drome team strained against the weight of a wagon loaded high with wine casks. The ratchets were set on all six of its wheels. In arrhythmic spasms they whacked and clicked while the wheel rims scraped on stone and the dromes' paws scrabbled for purchase among the cobbles. Isak backed against a villa's wall to avoid the snapping jaws of the left-lead drome. Beside him, Artaneel did the same. The drover beat his goad against the wagon's side.

"Ho, good heirophant," he called, leaning down. "Already the leaves be full on the vines. How promises the vintage?"

Artaneel's jaw lifted. "You have asked at your shrine?"

The drover waved his goad. "Aye. And gave offering."

"Beyond your tithe?"

"Aye. Half again my tithe."

"Yet you must ask?"

"They have been known to mislead, good heirophant," said the drover. He touched his brow. "Seeing you come from the Temple, I had thought perhaps . . ."

"From," Artaneel stressed. "Not of. As for the foretelling, you were told what our gods would have you know."

"You want to know if the wine will be good?" Isak asked.

"That, and whether the harvest will be plentiful or slack, and when it will come. And what the storms will do."

"You expect more of our gods than they will give," Artaneel said.

"They will give some storms," Isak said. "I cannot say where they will fall, but there should be only a few."

"As few as the last growing time?" the drover asked.

"Possibly a few more," Isak said.

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"More like the time before that." Artaneel's hand clamped on his arm, but he paid no attention. "As for the season, it will soon turn cool. Rain will fall on the vineyards. The grapes will ripen slowly and the harvest will come late. I know you do not welcome this—" He could see it on the man's face "—but I tell you truth. That is what the gods will send."

It was hard to look up at that man's scowl, that man with the goad in his hand. But he had spoken truth, unwelcome though it was. He should fear nothing.

"You be not a priest," the man said, narrowly peering. "How can you be saying what the gods will send?"

Artaneel's hand on his arm was urgent now, but he did not move or heed. "It is what I know," Isak said. He nodded to his heirophant. "He has never known me to read them false."

The peering eyes turned to Artaneel.

"His foretellings go beyond the sanctions of the Temple," Artaneel said. "His methods do not conform to doctrine. But—" grudging now "—where I have had occasion to review his foretellings, I have discovered no fault."

The drover's glance returned to Isak. His face wore a new look. "A prophet?" he wondered, cautious, but with a touch of awe.

"No," Isak said. "They are only foretellings. I am not a prophet."

"And you have said enough," Artaneel said, hauling on his arm. "Come. Already we are late. You—" to the drover "—go again to your shrine. Give offering again. Thank our gods for the knowledge they have given."

"Even though the shrine priests told otherwise?"

"They serve our gods," Artaneel said. "As do you and I, and—yes!—this boy. Gods whose signs and ways are often beyond understanding. Isak, come."

They edged past the wagon's big wheels while the drover shouted at his drome and applied his goad to the mid-body haunch of the one nearest. The beasts snarled annoyance and pawed the stones. The wagon creaked, lurched, began again its jolting uphill progress. Isak cringed from the rear wheel as it moved past him.

"Should I have said nothing?" he asked as they resumed their descent. "Clearly the knowledge had value for him."

"You should have left it for the priests of his shrine to decide what he should be told," Artaneel said. "They had their reasons."

"Their own reasons," Isak said. "No one knows what reasons the gods have."

"It isn't needed to know our gods' reasons, to serve them," Artaneel said.

"Do I not serve them also?" Isak wondered.

Artaneel glared at him but said nothing.

"It appeared to me," Isak said to his heirophant's surly silence, "that the priests of his shrine must have seen advantage for themselves in falsely telling him. As you must know, it is a thing that happens, and it is the only reason I can think of."

"Something about the wine," Artaneel said. "Very possibly. Nevertheless, by speaking you cast doubt on all the Temple—gave weight to the most

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subversive whisperings, of which there are many. You would put in danger the entire structure of—''

''Should I permit to stand a thing that is not true?'' Isak asked.

Artaneel uttered an exasperated snarl. ''You are a puzzle to me, Isak. In some ways so perceptive. In others an innocent boy.''

Isak struggled to understand. ''Because I thought the Brothers would be wise? Should I have thought otherwise?''

''Men have had their tongues split for asking such questions. Be warned.''

''Do they fear the truth, that they are not?'' Isak asked.

''Enough,'' Artaneel said. The firmness in his voice forbade another word. ''Isak, it is only this: they are men not accustomed to thinking of our gods in the way you have taken to think of them. As I took pains to warn you. Nor will they adopt your way of thinking merely to accommodate you. To explain your prophecy—your foretelling, that is—in terms of your own way of thinking, not theirs, and expecting to convince them by that method, is folly of the highest order.''

''I could explain to them no other way, good heirophant,'' Isak said. ''Should I have been less than truthful to the Council of Brothers?''

''You twist what I say,'' Artaneel snapped. ''I say only you expected too much of them.''

''But if they were wise . . .'' Isak began, but saw the look on his heirophant's face. ''Have my foretellings ever led you false?''

''That has nothing to do with it,'' Artaneel said. ''I must admit I do not myself grasp how you come to know how the gods shall stand in our sky. Nor has it concerned me to know; scribe's work. But now that I am caused to think on it, I see that I should have been more thoughtful. I should have realized that, to do what you were doing, you had to be dabbling at prophecy, regardless of what you said you were doing.''

''But I am not a prophet,'' Isak said. ''I am only a scribe who has come upon a method to anticipate how the gods will share our sky. Anyone, properly informed, could have thought of it. And, knowing the method, anyone would come to the same findings as I. Should I claim mystery where there is none? Is it not enough of a marvel merely to have that knowledge?''

A gate opened in the wall a few paces ahead of them. A woman in a servant's smock and leggings bustled out. She glanced their way, but dumped her jar of slops on the cobbles without a pause and disappeared back inside. They barely missed being splashed. Wrinkling his nose, Artaneel stepped around the mess.

''It does not matter what you call yourself,'' he said. ''The Brothers see it as prophecy. No—'' He corrected himself. ''They see it as an *attempt* at prophecy. Had you the wit to be facile in explaining to them, perhaps they would have believed. But you were not.''

''When it happens they will know I offered truthful guidance,'' Isak said. ''It will be a frightening time for people if they have not been forewarned, but—'' He shrugged, and scuffed the stones. ''I have done what I could. And it shall pass, and nothing will be changed.'' Slowly he had realized that,

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in his disappointment, he had been graceless to this man who, for all his scolding, had tried to shield him from harm. "I hope your efforts for me will not bring their displeasure on you."

Descending steeply, the street doubled back from the edge of a ravine to begin another traverse. The cobbles were almost like stair steps. Artaneel reached out. "Steady me, lad." Isak took his hand and helped him pick his way down. Beyond the turn the way leveled out. Here the villas were smaller. Flakes crumbled from the stones of the walls on either side. Artaneel took back his hand.

"Their displeasure will not touch me," he said. "I am expected to report all prophets that come to me. In their view, that is what I have done. From the beginning, the hazard has been only yours."

Mention of hazard turned Isak's thoughts inward again. He trudged on in silence. Here the cobbles were strewn with more garbage than among the higher villas. It was necessary to be careful where they set their feet.

"But they will wait until after the overtaking, won't they?" he said suddenly, speaking even as the thought came. "And then they would know."

"If they thought it possible your prophecy had a crumb of truth," Artaneel said. "Otherwise, why should they?"

"But in the *Annals of Prophecy*, every time there was doubt, that is how it was done."

Artaneel snorted. "Children's tales." The toe of his slipper sent a salt roast's rind skittering over the stones. "Is that your true belief, Isak? Truly?"

"Is it not true?"

"Once I believed it," Artaneel said. "Now I have come to suspect such tales are told to encourage a prophet to reveal himself." His hand sliced the air. "Have you thought? In all the *Annals*, there is no account of a prophet who was wrong."

"But I am not wrong," Isak said. "In all my studies I have not found one occasion when—"

He broke off at the scuffle of paws behind them and looked back in time to see an acolyte with flying cloak astride a piebald hund pelting toward them. The beast's speed and nearness magnified its apparent size; it seemed to fill the street. He thrust Artaneel against the wall on the street's downslope side and flattened himself beside him. On his shoulders he felt the breath of the beast's passing. When he looked again, he caught only a glimpse as steed and rider disappeared around the next switchback's turn. Flurries of scavenger bats burst skyward from the lower streets, marking their progress.

"They do not often show such haste," he said, still shaken.

Artaneel stepped away from the wall. "A fact you might wisely contemplate, Isak," he said. He found a clean stone with enough of an edge to scrape his sandals, removing the worst of the mess he'd stepped in while getting out of the acolyte's way. "We do not, of course, know the nature of his errand. But he came from the direction of the Temple, and he is now ahead of us in the direction we are going. Do you know of any other matter that presently occupies the attention of the Brothers?"

"There could be many things we

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have no knowledge of," Isak said. Unexpectedly, the heirophant had begun to walk again; Isak had to scramble to catch up. "Many things. Have we reason to believe his haste was in the service of the Brothers? It could be an entirely personal errand. Or some priest's."

"While he wears that crested cap?" Artaneel demanded. "And that hund wore Temple livery."

"It has been known to happen," Isak said.

Artaneel's response was to stop and turn to face him. "And you would take that risk? Isak, though I may earn the Brothers' censure, for your welfare I would suggest you turn back—take some other course. Those travelers we passed might let you join them. Then you would be safe."

"But if I flee they would have reason to think I had doubt of my foretelling," Isak said. "Then, even when the darkness has come—as I told them it would—they would not see my right to honor, nor the merit of my understanding of the gods."

Artaneel snorted. "Small benefit for you if by then you are feeding the eels."

"Surely they would wait." Almost painfully, Isak wanted to believe that.

"Gamble your life as you wish," Artaneel said. "I have given my advice."

"Have you less . . . less respect for them than I?" Isak wondered.

For a moment, the heirophant's face wore a closed, sullen look. Warily he looked around. They were almost alone on this part of the street and none of those who shared it were near. Nevertheless, when he spoke, it was with careful words.

"I have known them longer than you, Isak, and more closely. They are men like other men. Like all men, they have failings."

Less sure of himself than he wanted to be, Isak moved his weight from one foot to the other. But it was purposeless to stand there, going neither uphill nor down. He took a tentative step, then another, downhill.

For a distance they walked in silence. Around one turn, down the length of the next traverse, and then around the turn at its end. Through that silence Isak's discomfort grew. He had made the proper choice. He was sure of it. Yet still he felt doubts. As they descended his doubts deepened.

"Do you think I have not been wise?" he ventured finally.

Here the street had widened and become more populous. Servants in household liveries came and went on their masters' errands. Merchants' wagons stacked with goods labored up the slope while attendant hawkers pounded blank-paneled gates, shouting their wares, or haggled at opened gates with those inside. A beggar with a dirty rag across his face felt along the wall, crying alms and rattling his bowl. A few bareheaded acolytes strolled carelessly with the human tide. A gentleman's carriage passed them, city-bound, two matched drome at its hitch and four footmen in black-and-crimson tunics trotting ahead to clear a path. A curtained palankeen followed, borne by four stolid, barefooted porters who, with no choice in the matter, trod onward regardless of the filth that lay thick on the stones. Gorged bats hopped out

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of the way of their feet, hopped back to feed when they had gone on.

"I am divided," Artaneel said. Isak could hardly hear him above the noises of the crowd. "You have served me usefully. Your foretellings have brought me stature in my service, and might have brought me more had I dared place greater reliance on them. Yet this prophecy of darkness has seemed from the beginning too preposterous for any clear-thinking man to consider. No. In this, from the moment you came to me with it, I must say you have been terribly unwise."

"Should I have done nothing?" Isak asked. "Told no one? To know that such a thing will happen and not speak? Not to anyone? Could you, if you had foreseen?"

Artaneel shook his head. "I do not know. I have foreseen no such happening. I do not believe it possible. You asked if you have been unwise, and I have told you. If no one has believed it will happen, have you done any useful thing by speaking?"

"But the truth will come, and then they will know," Isak insisted. "It will happen. I promise it."

"And by then, if you persist in your unwisdom, the eels shall have eaten," Artaneel snapped. "I advised you and warned you. Now, do you see?" He pointed.

Far down the street, down at the end where it turned back on itself, a squad of Guards toiled upward around the turn. Traffic parted around them as a river might break around a stone.

"I would suggest you decide what you should do," Artaneel said, "before the choice is taken from you."

"They might have nothing to do with me," Isak said.

"A chance you could take," Artaneel said.

They were midway along the length of the traverse. On either side, the walls blocked view of all but sky. On the uphill side, the arched gateways all were shut, the stout carved doors as blank as sightless eyes. Across the street the walls were featureless except for the scratched scrawls and crude drawings left by generation after generation of vandals. On both sides, ugly barbs capped the walls, unspoken warnings to intruders.

Isak looked back the way they had come. Around the turn another file of Guards advanced downslope at a measured pace. Citizens dodged from their path. Gamow's light flashed from the tips of their pikestaffs. Their helmet crests were bobbing puffs of color, gold and green and indigo. Swords in scabbards bumped their thighs.

"They might have nothing to do with each other," Isak said, but even as he spoke he doubted. His glance went to Alpher, now almost at his highest, and Gamow, now significantly to the west. The Pale One, still low, was hidden by a shoulder of the bluff above. "The Guards at the Temple should be changing soon."

"If that were their mission, they would walk the Way of Priests," Artaneel said. Isak nodded. He had known that. But he didn't want to believe.

Again Isak searched his surroundings for escape. Both ends of the street were now sealed. The Guards advanced. The crowds, so thick only moments before, were suddenly vanished. He looked

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again at the walls, but they were all too high to climb and those serrate crests were like knives. There were places where the wall around one villa did not quite join with the wall around the next, but nowhere was the gap so much as a hand's span wide. He put a hand against a gate and pushed, but it held firm, barred from the other side.

He could do nothing but walk on, his heirophant beside him. His mouth turned dry. He tested the next gate, but it yielded no more than the first one had. The gap between that villa's wall and the one beyond was wide enough to wedge his arm into, but no more.

The Guards from below continued upward. The ones from above continued down. As they came near, the ones from below spread out from their straggled file to form a line that blocked the street. Glancing back, Isak saw the ones from above doing the same. His last hope and his last doubt died.

The corporal in command of the squad coming up from the city leaned an ear to the priest who trotted at his elbow. The priest gesticulated and, between deep gasps for breath, talked animatedly. He pointed at Isak and, a moment later, pointed again. Isak knew him: Plomme—Old Plomme was how the acolytes at the Narrow Streets Shrine spoke of him—middle-aged and plump, rheumy-eyed and still hopeful for advancement, despite ample evidence that he lacked the competence even for the post he held.

Isak pretended not to notice him. With the last few others in the trap he moved to slip through the line of Guards. Crossed pikes barred his way.

"Those two?" the corporal asked Old Plomme.

"What? Oh, yes. Yes. Definitely." Plomme bowed affably. "Oh, my, yes."

The corporal advanced, a thumb snubbed on his buckler's waist strap, a hand's-breadth from the hilt of his sword. His glance fixed Isak, then Artaneel. "You will come with us," he said, firm as stone.

Artaneel spread his hands. "For what offense?"

"I did not ask," the corporal said. His eyes were like pebbles. "I never ask."

Artaneel turned to Plomme. "My Brother!" he pleaded.

"Why, on yourself you have brought this thing," Plomme said. He doffed his tricorn, held it to his chest with both hands. He sounded astonished. "Had you remembered to serve our gods, as I . . ."

"But . . ."

"They say you have judged a prophet before he was judged," Plomme said. "Credulously, you heard him."

"I?" Artaneel spoke appalled. "I?"

"I only repeat what has been said," Plomme said.

"You will come with us," the corporal said again.

Artaneel touched his throat, aghast. "I? I?" Still not able to believe. Then, "No-o-o-o!" He flung himself against the corporal, sending him against his nearest man. As they staggered, Artaneel broke through the line between that Guard and the next and fled down the street, his shawl fluttering behind him.

Isak saw a Guard turn, notch a throwing stick to his pike, take stance, raise arm, and heave. The pike lanced through

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the air, a long, swift shaft, and struck between the heirophant's shoulder blades. Artaneel's stride faltered. His hands came up to clutch the metal spearhead that had burst from his chest. His legs buckled. He sprawled headlong on the stones. A second pike clattered down beyond his outflung arm.

It was over between one eye-blink and the next. Isak felt a terrible silence. Down the street as far as he could see, people crowded against the walls; the street itself was empty. Artaneel lay face down, his tricorn lying beside his hand, his brow pillowed on a rotting melon rind. Blood began to fill the cracks between the stones under him.

Isak hesitated no longer. He wrenched the pike out of the hands of the Guard nearest him, who had been making ready to hurl it. Holding it awkwardly, close below the tip, he jammed its butt into the man's face. Changing his grip as he ran, he ran along the line of Guards toward the wall across the street, knocking aside pike butts and spearheads with the shaft. As the men farther along dropped their pikes and reached for their swords, he veered away. A thrown pike hissed beside his ear. As he neared the high wall, still gripping his pike near its tip, he aimed its butt downward. The wall bore a badly done picture chipped into the plaster, probably obscene if he could have taken the time to look at it; also the scrawl, "Our priests and their gods, who be ever with us." A fragment of his mind wondered—some learned person?

As the pike's butt struck at the foot of the wall, he leaped. He hadn't done it since he was a boy, didn't know if he still had the knack. Still gripping the pike, he twisted his body upward as the pike's rigid shaft and his own momentum also swung him upward, upward toward the wall's sawtoothed crest. Up and over. Another thrown pike whisked past under him.

He hadn't known how far he'd fall. Until now it hadn't seemed important. Now he fell. It seemed to take a very long time.

He came down in a thornbush in a garden. A young woman rose from her loom with a startled cry. Thorns plucked at his tunic and leggings as he struggled out of the shrub. Some of the scratches on his wrists and ankles were deep enough to bleed. The woman fled to the house. Her upper body was bare; her belly, under a loose muslin skirt, was swollen with child. A pike's shaft stood before him, its point driven into the turf at his feet.

He took hold of the shaft, pulled it free, and turned to look back at the wall. It was twice as high on this side. Had he known he'd fall that far he'd never have dared. Looking up, he was just in time to see a Guard, handed up by his fellows, balance momentarily on the wall's narrow top, straddling the barb between his feet. The Guard raised his sword and, with an animal yell, jumped down.

Without thought, Isak raised the pike's point to defend himself. It was enough. The point entered the Guard's body under the edge of his buckler, burst out behind his shoulder. His yell became a strangled, shuddering gasp. He slid down the shaft like a bead on a string. Isak's grip was knocked aside. The Guard's sword clanked on the foun-

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tain's rim. He fell to the turf and writhed, blood spurting out around the shaft, legs jerking mindlessly, teeth bared in a grimace of ultimate pain.

Isak retrieved the pike. Blood smeared his hands. Standing over his kill, he looked up.

The head and shoulders of another Guard showed above the barbs. Black brows under tarnished, dented helm; edge of a dirty sweatband glimpsed between. For a long, still moment, Isak looked up into those eyes.

Then the Guard turned his head and shouted something to men out of sight on his side of the wall. His shoulders moved in a vigorous go-around motion. He dropped out of sight.

Isak whirled. He was alone in the garden with the dozen-colored flowers and the thorn bushes, the quietly spouting fountain, the abandoned loom. And, at his feet, the dead Guard. He dropped the pike and picked up the sword. The Guards would be coming around to the gate. He had to get out to the street and away before they reached it.

A gateless doorway led into the house. It was the only way. Sword in hand, Isak trotted around the fountain and along the flagstone walk. The woman had gone that way, but he'd seen no one else. And, though he knew almost nothing of how it should be used, a sword was in his hand. Three steps up from the walk to the portico; he cleared them in a stride. Two more took him within.

It was a kitchen. A fire-blackened oven squatted in the farthest corner like a watch beast's hutch. Above an ash-strewn hearth a black pot hung at the end of a chain. Knife-scored, a cut of heart-meat lay on the stoneboard to drain. Ahead of him another doorway led deeper inside.

He stepped through. It was a larger room, opening out on both sides of the doorway. Long, narrow openings high under the eaves let in the gods' light, and more came through the doorway beyond, through which Isak glimpsed a colonnade, an atrium lush with fern, and a pool. But it was a soft light, there in that room, and for a moment while his eyes adjusted he was half blind. He looked to one side—saw the outlines of a leather couch, a low table, an open-fronted cabinet with jars on its shelves. On the wall, recognizable even in its sheath and in spite of the poor light, the graceful curve of a Tokku sword; his glance flashed over it, but there could be no mistake. He knew what it was. He stopped as if his feet were noosed in a trap. A Tokku sword in some man's house? An ordinary house? What sort of household could this be?

For an instant he was tempted to take it in place of the sword he held. But it was a treasure; probably it would be useless as a weapon; and he had no time to waste.

He began to turn the other way—saw movement from the side of his eyes—turned more quickly then, lifting his sword, and saw the woman, saw her arm come down and something white in her hand. Something hard struck his head. Light exploded in his eyes. After that, for a long time, nothing.

On a clear starry night near the beginning of the survey we all lay wrapped in our blankets gazing

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at the sky. The men, a little distance from me, were arguing and eventually appealed to me to arbitrate. Three of them contended that our journey across the lake from Kalokol, a distance of twenty-four miles, had brought us significantly closer to the edge of the earth, while the fourth maintained that it was still a long way off.

—Alistair Graham

He woke to dim light, silence, and a head full of pain. He moved and discovered the hard, uneven surface under him. His hand found the lump above his ear and a sore spot that hurt like a flame when he touched it. It felt sticky to his fingertip. He tried to rise. A hand pushed him down again.

"Mind y'r head, lad, else ye'll klonk it again."

He opened his eyes. It had been good advice. So close he could reach up and touch them, thick wood rafters supported a ceiling of stone slabs. He turned his head, seeking the source of the light and the voice. A grey-bearded man in a servant's tunic sat beside an oil lamp. His head almost touched one of the rafter beams.

"I'd suggest ye lie quiet, lad, and—if ye must—talk soft," the man said. "Ye'll notice ye be not trussed. 'Twas the young mistress thought ye'd not mind these accommodations overmuch, considering the Guards be seeking to have conversation with ye, they in an unfriendly mood. Aye, and besides, ye with a Guard's blood on thy shirt."

It was more information than Isak could make sense of; his head hurt even more than he'd first thought. He put a hand to the sore spot again. "What . . ?" It was as much of a question as he could put together.

"Aye," the old man said. He chuckled. "A gentle girl she be; but ye should know to knock upon the gate. 'Tis more polite. Bashed a fine pot, she did, and now—it be her way—speaks hope thy head shall have proved more durable."

He hesitated, and when he spoke again his tone had changed. "'Twould gratify us all. She be having much sufficient sorrow for one small girl."

Again Isak tried to rise. He had to find out more. The old man put a hand on his shoulder. "Patience, lad. Time enough when fewer Guards infest the neighborhood. Aye, and when thy head be less rattled. For the now, ye're safe, which is more than ye was. Till the master's settled his mind about ye—aye, and those he talks to—'tis better ye're told not much."

It didn't satisfy, but as a prisoner he couldn't demand to be told more. "At least," Isak said, "may I see where I am?"

The old man cocked his head, gestured permissively. "But mind the rafters."

Cautiously, Isak rose on an elbow. The lumpy surface under him, he found, was a pile of muslin-wrapped bundles stacked neatly against one wall. As for the chamber itself, it was narrow and only a stride or two longer than the length of his body. He'd seen acolytes' study cells that were bigger, and his booth at the Narrow Streets Shrine had been almost as large. The lamp that gave their only light perched on a corner of a massive leather-strapped chest that blocked one end. The servant sat on a

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smaller chest in front of it. The rest of the opposite wall was clear and had been cut, apparently, from layered stone. So had the other walls, what he could see of them. Thick timbers which looked very old supported the roof beams. The floor was pounded earth.

Back of his head, the chamber narrowed to the width of a man's shoulders and closed down to half a man's height. At the end of a short tunnel three stones, one large with two smaller resting on it, blocked the passage.

That told him where he was. Every villa had such a place: a secret vault where heirlooms and treasure could be hidden from pillagers, thieves, and tithe collectors. Some had several. It also confirmed what the old man had said; for his own reasons, the villa's owner was keeping him safe. But also, it would seem, captive.

It was less than he wanted to know but more than he'd known. And it gave a thread of hope. He lay back on the improvised couch. "Could you put out the lamp?" he asked.

The servant started to move. A careful look came to his eyes. But then he grinned as understanding came. "Hurts thy eyes? I'll shield it for ye." Twisting around, he reached for the lamp.

"No," Isak said. "I want to know what it is like to have no light."

The careful look came back. "Ye daft? If it be seeing nought ye're wanting, 'tis enough to shut the eyes. Seek ye to evade even such of the gods as watches through a lamp's fire?"

"I'd like to know," Isak said. He couldn't explain it more clearly than that. "I don't think closing the eyes is exactly the same."

The servant snorted. "Huh! And why, now, should I satisfy ye?"

Isak hadn't thought about that. "I was hoping you might want to know too."

"And why should I?"

"It would be useful to know," Isak said. "A time is coming when none of the gods will give us their light. I think it might be worth knowing what to expect."

"The mistress klonked ye too hard, lad. Ye're daft. Daft as a mine digger."

"It's true. I know it," Isak insisted.

The servant chuckled. "Aye. And then the world shall be tipping up on edge and such of us as lack strong grip shall slide off."

The man was no more able to understand than the Brothers had been. Well, he should have expected no more. "It makes no difference if you don't believe," Isak said. "It will happen. And I would like to know what it will be like. That is why I have asked."

"It be a morbid curiosity ye indulge, lad."

"Perhaps," Isak admitted. "I have noticed many people are not curious about our universe. How is it possible not to be curious? I think I must be different from them." He shrugged. "I suppose they must think I am the one who is strange."

The old man touched a finger to the side of his nose. "Indeed, lad. All of that."

"Nevertheless," Isak said, "I hoped you might be curious."

"That I be not," the old man said. He leaned back, hands on knees. "But now, the young mistress has said ye be a guest, and in this house a guest's

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pleasure be indulged if it be not too exotic. Strange be what ye ask, but not a difficult thing to grant. And while we're blind ye'll not embarrass the house by such adventures as to wander off? 'Twould stand a blot against our hospitality, that, and perhaps attract some less-than-welcome notice from the Guards."

"If I am hidden from the Guards, why should I want to leave?" Isak asked.

"We've got thy honor?"

"More than my honor," Isak said. "I am in your debt."

A smile gleamed through the white beard. "Aye." He patted his belly. "'Tis odd entertainment ye request, lad, but never be it said this house would disappoint a guest."

As he spoke, he reached behind him to pluck the lamp's wick from the lip of its vessel. He snubbed it on the floor between his sandals. For an instant a red spark persisted. Then it too died.

"Do it satisfy, lad?"

"I don't know," Isak said. It was strange, this darkness—a darkness such as only the buried dead might know. He closed his eyes and opened them again. It was as if he hadn't opened them. Strange. He could hold a hand in front of his face. He could know it was there as surely as his tongue knew where his teeth were, but his eyes saw nothing. Not so much as a shadow. Black wrapped in blackness.

"Ye been seen enough?"

"No," Isak said. "I want to think about this."

They'd be terrified, he thought, breathless. People would be terrified if a darkness such as this broke upon them without foreknowledge. Even knowing there was nothing strange about the black he was in, he could feel the desolation, the emptiness of being removed from the sight of the gods. He wanted to reach out, find them, call them back. He didn't know how. They were gone, gone beyond reach of his hand, beyond the farthest extreme his fingertip could strain to touch. But it wasn't real. He knew he could end it: he had only to speak and the old man would spark the lamp again. The darkness would go.

That made it possible to bear. Those frightened people would need to know that the gods and the benevolence of their light would return; that the darkness would be for only a small breath of time.

He put out a hand. The thick wood beams that supported the ceiling were where they had been. The stone wall beside him was unchanged. The coarse-woven sacks and whatever they contained still formed the couch on which he lay. In the air he breathed, the taint of the snuffed lamp was a biting stench. His nostrils burned. His eyes stung. Though they did not see, still they could feel pain.

So the world existed even when the gods did not watch. He wondered if that meant the world existed independently of the gods or whether it meant only that they knew of it even when they did not watch and it continued to exist by that frail thread. He had no way to know which possibility was true. He wondered if . . .

"Now, lad?" the servant persisted. "Ye've been enough indulged. It be unnatural."

"I'd like to think a little more," Isak

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said. It wasn't possible to grasp the whole experience in a moment. Unnatural? The servant had used the word, but it implied some things were natural and some were not. Did that mean all possible things were natural?

"Ye tricked me, lad," the old man accused. "Blind as ye've made me, and me without a coal to spark our lamp, to gain again the gods' attention be outside my power."

"I hadn't thought of that," Isak said. "Really I hadn't." Was it possible there were things beyond the power of the gods?

"Now ye and I be trapped in this dark, deprived as mine diggers. Ye swear ye did not scheme it?"

"How could I know? You have no flint? No tinder? I never imagined it would be like this."

"Nor I, lad. Ye say a time like this be coming for the world?"

"It will be much like this," Isak said.

The old man made a noise like a shudder.

"It won't be for long," Isak said. "Less than the passing of a single god."

"Long enough, that be."

"But you'll know it's coming now," Isak said. "You'll know it's nothing to fear."

"Still I dislike it, lad. It be unnatural."

That word again. "Can a thing that happens not be natural?" Isak asked. Could the gods intervene, he wondered, and by their powers cause an unnatural thing? Did the gods have such power?

"Tease me not with riddles, lad. What's natural be natural. Strange things as ye talk of—can such be natural?"

"I don't know," Isak said. "I'm wondering."

"I've no answers for ye, lad."

"I have none for myself," Isak said, and fell silent. It was hard to focus his thoughts. There were so many questions, and he could answer none of them.

For us like any other fugitive,
Like the numberless flowers
that cannot number
And all the beasts that need
not remember,
It is today in which we live.
—W. H. Auden

A long time passed. It seemed a long time. He grew accustomed to the dark—even found it, in a perverse way, restful. There were fewer distractions now that the old man was quiet. It let him think. The only troublesome part was that he couldn't write down all the questions that took shape in his thoughts. He would have to remember them.

How long he waited in that dark, sometimes talking with the old man, sometimes silent, he never afterwards found out. It ended with the scrape of stone on stone, the intrusion of diffused light from the entranceway, and a woman's voice.

"Hobur? What happened to the lamp? Are you all right?"

"Aye," the old man said, rising. Hunched over to save his head from the ceiling beams, he approached the entrance. "To quench it he inveigled me, but we be not harmed."

"And our guest? Is he all right?"

The old man was now in the entrance, kneeling. His body blocked most of the

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light. "Aye. Wakeful," he said. "Seems to talk sense if ye think not too sharp on what he be saying. A strange one, be him."

"I didn't hurt him, did I?" Anxious.

That brought a chuckle. "Not the strangeness of an addled skull, lass. Be sure of that. More like . . ." He left it hanging for the space of a breath, two breaths. "More like a boy knowing more than be good for him."

"Perhaps I should see him myself."

"It be not necessary."

"Hobur!" Scolding. "I'll decide that. Here, take the lamp." A pause. The quality of the light changed, brightened. "Help me up, Hobur," she said. Then, complaining, "It didn't used to be this hard."

The lamp shifted from one position to another. It made odd shadows. "'Tis thy affliction, lass. Patience. Soon be done with. Take my hand."

Light and shadow flashed wildly on the walls. Sounds of straining muscles voiced, a scuff of feet. "Mind thy head, lass. 'Tis not a place for walking tall."

They came into the chamber, Hobur leading with the lamp, the woman following. Both walked in a crouch, though the woman, being much the shorter, did not have to bend as much as the servant. It was the same woman, though now a shawl covered her breasts. She was small and she might have been slim but for the child that bloated her. And, seeing her now in less hasty circumstances, Isak saw that she was very young.

"May I look at your head?"

Isak raised up on an elbow, turning his head so she could see where she'd struck him. "Hobur, I need the lamp."

Hobur brought it closer. Her fingers probed Isak's hair around the wound. "Who are you?"

"I was a scribe who served Artaneel, heirophant of the Narrow Streets Shrine," Isak said. He could not look at her as he spoke; she was still exploring his injuries. "Now . . . He's dead now. My name is Isak."

"I'm Kalynn," she said. "And you are a guest in the house of Palovar." She touched a sore spot, so sore it made him suck his breath. "I didn't mean to hurt you," she said.

"Giving me to the Guards would have hurt more," Isak said. "I should thank you."

"We might yet do that," she said. She let him lie back. "You wear the Temple's trappings, but you fled the Guards and killed one. They said you are a false prophet. Is that why they wanted you?"

"It's not a prophecy," Isak said. "I produced a foretelling that a time will come when no god's light will shine on us. I tried to bring it to the Brothers, but they would not believe. I think they sent the Guards to take me. They . . . while they were killing my heirophant, I escaped. You know the rest."

She frowned. "But always there is at least one god in our sky," she said. "How . . ?"

"Actinic Gamow shall overtake the Pale One," Isak said. "He will pass behind her. She will block his light. No other god will stand in our sky when it happens. So, for a time, there will be darkness."

Her frown was still there. "Can such a thing happen?"

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"It shall," Isak said.

"And that would be terrible?" she wondered. "I have stood in the light of the gods. It is no blessing. Would it matter if the gods do not watch for a while?"

"Do you know what darkness is?" Isak asked. "I—"

"Mistress! Do not listen to him," Hobur warned. "He will trick ye."

"Please," Isak said quickly. "I mean no deception. I was going to say only that darkness is—" He didn't have the words. "It is very strange, and I had thought the Brothers should know. But I think even they were made fearful by the thought of it. So . . . here I am, your captive instead of theirs. Perhaps I deceive myself, but I think I need to fear you less."

Grave-eyed, she studied him. Her face wore a blend of thoughts and feelings more difficult to read than an apprentice scribe's first scrawl or a scholar scribe's most learned treatise. "If it were only what I wanted, I could say you are safe with us," she said at last, carefully. "But it's not that simple. The Temple has no friends in this house. I think it's all right to tell you that much. But . . ." Her hands gestured emptily. "I don't know what we can do with you. I don't know what we *should* do. My father will decide; he and his friends."

While she spoke, he had watched her face. What he noticed were the grey eyes, the curve of brows and rounded chin, the broad mouth that, smiling, would have glowed with warmth. Her hair was yellow. The lamp's light caught a few stray strands and turned them into threads of gold.

"We left your sword outside the gate," she said. "It fooled them. They thought you'd escaped down into the city. We let them look through the house. We even let them see our other vaults. We've got . . . well, never mind how many. And they cleaned up most of the mess you left, though I don't think we'll ever get all the blood off our fountain. We'll have to keep you hidden—they still might come back—but right now you're safe. At least until Father decides what to do about you."

"Palovar," Isak said. "Is that your father's name?"

She nodded. "He's the one who has to decide. I wish it wasn't all so complicated."

Her talk of decisions made him uneasy, but it was out of his hands. He lifted a hand, let it fall. What happened would happen. "I have no other place to go," he said.

"I hoped you wouldn't mind," she said. "It's just that we don't know what to do. You came so suddenly." She started to turn toward the entranceway. "We know almost nothing about you."

"But you're willing to learn?" he asked hopefully.

For a moment amusement transformed her face. She was beautiful when she smiled. She touched his shoulder—just her fingertips, quickly, and away again. "You must be hungry. I'll send something down."

He hadn't thought of it. It was low in the priority of his concerns, but she was right. He knew as soon as she spoke.

"I would like that," he said.

"We're terrible hosts. Really we are," she said.

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"You didn't know I was coming," Isak said. He'd hoped to make her smile again, but she only made a face at him. Then she was gone.

In a constant environment the great majority of the individuals of a species are very precisely fitted to their habitat, and almost any change from the typical will be a disadvantage.

—*S. A. Barnett*

It was a long wait. Isak asked to have the lamp snuffed again, but Hobur refused with a growl. When the food came it was cold meat and warm apo cakes and a jar of wine. Enough for both of them, but Hobur ate only a little. He sat on the small chest with the big chest at his back. The lamp, perched on the corner of the big chest, burned brightly behind his ear. Undisposed to talk, he sat with his hands on his knees and looked straight ahead down the length of their chamber. Isak had little to do but think.

He asked for a waxboard and writing tools. Hobur leaned back, gazing at the ceiling beams. A scowl squeezed his brows. He handed Isak the board their meat had come on.

"Perhaps enough grease be there to serve thy need. It be as near to what ye ask as this house holds." Having spoken, he resumed his silence.

The board was dark and the grease was a thin film on its grain-ribbed surface. Nibbling a fingernail to the proper edge, Isak made a few experimental scratches. Had it been a waxboard, and had he been in his own booth, he'd have handed it back to the apprentice. Here and now, though, it was an improvisation he could only make the best of. With the heel of his hand, he rubbed it smooth, paused to collect his thoughts, and began as carefully as he could to put down all he could remember of how it had been to be in darkness. More and more as he scratched the board, he realized what a strange experience it had been. He filled two columns with careful notations and began a third.

He was still at work, about to begin a fourth column, when the grinding sound of stone on stone announced another visitor. Hobur rose, gave Isak a scowl that told him to stay where he was, and disappeared into the entranceway. More stones moved, voices spoke, then Hobur returned. Another man followed.

There was nothing subservient in the way he moved. Less tall than his servant, the newcomer was thick of body, heavy of limb. His hunched-over gait gave an emphasized view of the almost hairless top of his head and the gone-to-grey dark hair of the tonsure that rimmed it. He wore the doublet and breeks of a prosperous townsman, though nothing betrayed the nature of his trade. Isak felt the scrutiny of his eyes.

"My daughter tells an interesting tale," the man said. So this was Palovar, his host and jailer. Isak waited.

"Unfortunately," Palovar went on, "she knows only part of it, and what she knows is not enough to make judgments on. So . . ." He planted himself on the chest Hobur had used. "How did you come here?"

Hobur had been hovering over the chest. He scuttled to a corner near the

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entranceway and crouched there.

"I think they would have killed me," Isak said. Not until he spoke did he realize it wasn't the way to begin—that it would make no sense to the man. He made the thumb-smudge gesture only scribes ever learned and few others ever learned to recognize; rub it out and begin again. Palovar nodded, as if seeing a surmise confirmed.

"I am a scribe," Isak began again, and told his story. It was long in the telling. As he talked he watched the scowls and narrowing eyes and quirking corners of the man's mouth. He saw the expressions of a man who didn't understand and was skeptical of what he was told. Time and again Isak paused in his narrative to explain one point or another. There was much that needed explaining. Sometimes he knew that he failed. "When I woke, my head was hurting," he concluded, "and your man was watching me."

"More to be sure you weren't seriously hurt than as a guard," said Palovar. He spoke absently, as if his thoughts had turned elsewhere. His thumb scratched his jawline through his greying beard. "You've told me much I must think about." Again, a long, paused silence. "My daughter is impulsive and frequently too kind for her own good. It might have been wiser to give you to the Guards or let you escape to the street. Then we'd not be involved. Now, though . . ."

He got up slowly, careful of his head. "For now you'll stay here. Not very gracious quarters, but the best we can offer under the circumstances. You understand, I suppose."

Isak didn't. Not entirely; only that Palovar was reserving final judgment of him. He waited. Again he felt the scrutiny of that man's eyes.

"Do you doubt me?" Isak asked. "You could go up on the street behind your garden. I think you would find some blood on the cobbles."

Palovar nodded absently. "I've seen the blood on my fountain, and my daughter saw that Guard die. That part I do not question. But now my house has given you protection when you might have been given to the Guards. That complicates matters. We must decide what to do with you."

"I did not ask her to hide me," Isak said. Anxiously he gestured his innocence.

"So I understand," his host said with a wry chuckle, then added soberly, "that doesn't change your situation. Nor mine."

"You could let me go," Isak said. "Put me out in the street and you'd be done with me."

Again a preoccupied nod. "Almost right. But if, then, the Guards took you, they might learn my house had hidden you."

"I would not tell them," Isak said. "I promise you I would not."

"Willingly, perhaps not. But they have been known to use . . . call it persuasion. No. Our choices are: first, we could keep you prisoner indefinitely. There would be risks in that, but that is one choice. Or we could accept that all you have told us is true and let you go, taking with you the knowledge that my house is not unfriendly to those who are themselves not friendly with the Temple, which we would prefer the Temple did not learn. Or we

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could . . . shall we say, dispose of you in a way that will not leave us exposed to those hazards.''

''Kill me, you mean.'' He could speak of it with objective calm, as if it were a stranger they were talking of. But something inside him shrank to the size of a stone.

''Or cut your tongue.'' Palovar looked thoughtful a moment. ''But you're a scribe, you say, and you talk like one. Perhaps take off your writing hand also. And—yes—your eyes.''

''The other fate would be more kind,'' Isak said quietly.

Palovar grimaced with distaste. ''For now, you'll stay here. Until we decide.''

Isak nodded, as if resigned to accept what he could not change. To himself he resolved to watch for opportunities and take what chances might come. He'd be a fool to do anything less. He might as well have let the Guards take him.

''I have done my best to tell you only truth,'' he said.

''We'll investigate that,'' Palovar said. ''Such as we're able. Understand, it's not as if we want to do you harm.'' He started to turn away, but paused with a sudden thought and turned back. ''Even when you say the gods will abandon us?''

''It will happen,'' Isak said. ''I know it as surely as one can know anything in this world.''

For answer he was given a dark scowl. ''Although that is the most preposterous thing you've said?''

''Do you know with the same sureness it will not happen?'' Isak asked. ''Do you know a proof why it is not possible?''

The scowl did not change. ''I've learned not to bicker with scholars. It is useless, and brings me not a whit closer to truth.''

''I must admit there is wisdom in that,'' Isak said.

That brought a bark of laughter. ''Common sense.'' Decisively, but mindful of his head, Palovar stood up. ''I may come again. I may not.'' With a gesture he instructed Hobur to go ahead of him. In the entranceway he paused.

''I can promise you nothing. The safety of myself and my household is not the only aspect of the matter we must think about. But I will say—my daughter wants you to know—the . . . ah, third choice I mentioned, though it would be the simplest and would assure us the greatest protection, is the one I find least attractive. My daughter feels . . . well, responsible for you. As if she has not had troubles enough! Aye, and much unhappiness. But should you try to escape . . .'' His hand chopped down.

> *Wherever I found a living creature, there I found the will to power.*
>
> *—Friedrich Nietzche*

For a while after they left him he scratched at the board. It was remarkable how much could be written about darkness. He considered snuffing the lamp again, to refresh his perceptions, but decided not to. There'd been the problem when Hobur wanted to light it again. Meanwhile, he was finding the

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board a poor writing surface. The grease was uneven in thickness, and he had to take care how he held it, for even the lightest touch in the wrong place would obliterate what he'd written. It was easier to make corrections, though, than in wax: he'd have to remember that. Too soon, his notes filled the board.

He explored his prison. The entrance tunnel was blocked at its far end by a clutch of large stones wedged together from the outside. They fitted tightly and the few chinks remaining were filled with mortar, giving the appearance —even from the inside—of a solid wall. The floor sloped gently downward away from the entrance. From behind the stacked chests at the other end, a drainage hole watched like a dark, hidden eye. The floor itself was pounded earth, scuffed and uneven. At one time it might have been oiled, but that would have been long ago. The chests were padlocked and wax-sealed, their seams caulked with bitumin. Knotted thongs secured the sacks and bundles, the cord ends being also fixed in wax. But gaps at sack mouth and bundle edge gave glimpses of treasure within: polished wood medallions from the river's high reaches, nuggets of raw turquoise from the Mountains at the Edge of the World, faience coins from the Valley Between the Two Deserts, and a glimpse of rainbow opal which could only have come from a wasteland plateau near the shores of the South Ocean. Through the opening where a bundle's wrap didn't quite come together, he saw a tapestry woven of threads so fine they gleamed with a coppery sheen.

He was investigating the slabs of stone above the ceiling beams when Kalynn came again. Almost certainly if there was to be a way out of this prison it would be upwards, for beyond doubt the vault was underground. One by one he was testing them, hoping to find one that could be shifted, however slightly, when he heard her take the first stone from the entranceway.

"Isak?" she called.

He crawled into the entranceway and helped her remove the rest of the stones. She was bringing more food, which surprised him because he hadn't thought so much time had passed since he had eaten. She handed up a plate of meat pastries, still warm from the oven, and a bowl of porridge so hot the earthen bowl burned his fingers through the folded cloth she'd wrapped around it, and a small jar of wine. Behind her, as he took the dishes, he glimpsed a chamber not much different from the one he occupied. He nodded; it made sense to conceal the entrance to a hiding place inside another hideaway. As he was turning to take his food back into his quarters, she set a foot on one of the stones and reached both hands up to him.

"Help me up," she said.

He looked at her.

"I want to talk to you," she said. "While you're eating. And I'm supposed to take the dishes back. They're afraid you might try to use them to dig your way out. Do you mind if I watch you eat?"

He helped her up. She wasn't heavy, nor did she lack strength. Her pregnancy made her awkward. They bumped and tangled clumsily in the narrow opening. She laughed at their confusion.

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She showed him how to carry the porridge bowl—just the fingertips up close to the rim where it wasn't as warm, and with the cloth double-folded. She carried it, following him into the chamber. She took the armchair he'd contrived out of bundles, leaving the bowl beside the chest that had been Hobur's seat.

"I played here when I was little," she said. She leaned back against the wall. "Before my head bumped the ceiling. It was my favorite place."

Isak sat with the plate of cakes on his lap. "Did you ever have your lamp go out?"

She tipped her head back and closed her eyes. "A few times. The first time it frightened me. But there was always a little light coming from outside. I never closed myself in like you were. Hobur's still complaining about that. The gods always knew I was here. Sometimes I'd put it out on purpose."

The cakes were tough-crusted, soft and moist inside. The wine was plain. Her talk seemed to need no response beyond an occasional nod to let her know he still heard. He ate and listened to her voice.

"I think Father wants to believe you," she said. "It's just that he's afraid of being wrong. He could lose everything he has. They might kill him—might kill all of us. He's trying to find out if you're telling the truth. He's sent the servants out to ask questions. And some of his friends. All but Hobur. Oh, and Bellreo. He's our gatekeeper. Hobur's just outside the vault. He's being silly. He didn't want me to come in here. He's afraid you'll do something to dishonor me, which—" she glanced down at herself, her swollen body "—under the circumstances is sort of ridiculous. Do you really think the sky will turn black? Father says it's the most preposterous thing he ever heard."

It seemed to call for a reply; Isak swallowed the mouthful he was working on. "I have tried to speak only truth," he said. "It isn't easy to be sure. But all our sky's light must come from the gods, for the color and strength of it changes according to the gods that are above us at the moment. And you must have seen how almost black it becomes when it is heavy with clouds, as with a storm. So I think if all the gods are gone from our sky, there will be no light. That would be blackness, would it not?"

"I don't know," Kalynn said. She appeared to consider the question. "I haven't thought about such things. It sounds so strange."

"It may never have happened before," Isak said. "It may never happen again. When I try to extend my calculations too far the errors accumulate. They become too large and I can be sure of nothing. I would think it should have happened before; I would believe the conditions would repeat, but it would have been long ago, before records were kept, before we knew the gods, and no one remembers."

"Oh," she said, and was quiet a moment. "Hobur was right. You're strange. But interesting. And . . . and what I really wanted to say, I don't know what Father's going to do about you, and maybe it's his friends—he doesn't tell me much about his friends—who'll decide what to do. But

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I don't want anything bad to happen because of something I've done." Her fingers twined around each other. "I don't want them to hurt you. I want you to know that."

It was her innocent sincerity that caught him. He wanted to tell her it would be all right, but he knew he could promise no such thing. "What happens, the gods will let happen," he said. Easy words to speak, but the thought was growing in him that the gods did not care what happened. Not to him or any man. "I have been taught it is absurd to think, because you played a role, you have a guilt for all that happens after. As well to say the river flows because it wants to fill the emptiness where you dipped a pot of water from it."

She tilted her head as if to listen to an inner voice. Her mouth shaped tentatively to speak, but Hobur's voice from the entranceway interrupted. "Mistress! Someone pounds our gate!"

"Oh." Quickly she was on her feet. For an anxious moment, before he could utter a warning, Isak was afraid she would strike her head, but with an easy movement he could not analyze she avoided all the beams.

"I have to go," she said. "If it's the Guards and they want to search again, they'll know I'm in the house, and if they don't see me they'll want to search until they find me. And we don't . . ."

Isak's glance went to the food. He'd hardly started to eat, and he didn't know how long it would be before she came again. "Oh, go ahead and eat," she said. Her hand fluttered. "If we're going to keep you here the least we can do is not let you starve. Do you think Father will let me keep you? I never had a pet before."

"Mistress!" Hobur called urgently. With a backward glance, she scuttled into the entranceway. Hobur's hands came in sight to help her down. Her face reappeared in the opening for just a moment before the stones chocked into place. "I still want to talk with you."

Then the way out was blocked again. The place seemed much emptier, more silent, with her gone.

If the Lord Almighty had consulted me before embarking upon creation, I should have recommended something simpler.

—Alfonso X
(Castile and Leon) "The Wise"

He was still eating, though, when the stones were again taken out. Palovar was first to come through the entranceway. The two who followed could have been anyone, wrapped as they were in voluminous muslin robes which got in their way as they climbed into the opening and came, crouch-bodied, through the tunnel. The first one growled curses; the one behind him was silent. Across their faces they wore masking scarves, and cowls over their heads like desert venturers. Isak had only a glimpse of their eyes.

"You will forgive the masks," Palovar said. "They do not wish you to know them, nor to recognize them later."

Isak nodded. It was a reasonable precaution. Presumably they were some of Palovar's mysterious friends.

The first of the newcomers paused

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where the entranceway widened, blocking the man behind him. He was the taller of the two. His eyes scanned around. "Where can we sit?" he asked. It was a voice in which echoed the tones of command.

Palovar moved quickly to pull down bundles from the pile against the wall. Isak rose to help, but was waved back. "Until we know more, you'll stay there."

"Father?" Kalynn spoke from behind the second masked man. "Would it be all right if I listen? I could just sit here and be quiet."

"The less she knows of our activities—" the tall one began.

Her father lifted a bundle, paused, leaned back to ease its weight. He half turned.

"Some she knows," he said. "She's known from the beginning. Do you think—" His voice took on a sarcastic tone. "—do you think she has cause to love the priests?"

"Women have been known to be strange in such matters," the tall one said.

"Well, I don't," Kalynn said. "I didn't before, and I certainly haven't had any reason to change."

"More to the point," Palovar said, "we're not here to talk of what we've done or hope to do. We're here because you want to question this fellow yourselves. Do you plan to tell him more than my daughter already knows?"

"Please," Kalynn said. "It's only that he tells of such a strange thing. I want to hear how he explains it to you, Eb—" She corrected herself. "—your man has the learning to judge his telling, and I think—I hope—he will tell you how such a strange thing could happen. It is so hard to believe, but he sounds to sure."

"As to that," the one identified as Eb growled with a glance toward Isak, "I say it's not possible. What I seek to know is what delusion lets him think we might take his prophecy seriously."

"Please, may I hear him?" Kalynn asked.

"It would do no harm, my lord," her father said.

His Lordship gave consent with a wave of his hand, as if it had never mattered. Palovar completed his task with the bundles. "Your place is ready, my lord," he said, sidling away from the settee he'd contrived. "I should ask your pardon; usually this house does not have guests in these quarters."

"Indeed," His Lordship said. He sat down, paused stiffly, then shifted his weight and shifted it again. Finally he slouched, every line of his posture giving evidence of dissatisfaction with the comfort provided. Eb scrambled down to sit cross-legged by his feet. Palovar took the place that had been Kalynn's and, before that, Isak's.

"Very well then," said His Lordship. He faced Isak directly, but even so Isak could see only those watchful eyes. "We have been told your story, but we would like to hear it from your own tongue."

"Of course, my lord," Isak said. Hardly knowing he did so, he put a touch to his brow. He told his story.

It seemed less difficult to tell this time. Less had to be explained. More could be left out. His listeners nodded as he spoke, recognizing a tale they had heard before. Through it all, Eb sat with

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his head turned aside, eyes on the floor, while His Lordship watched intently, sometimes narrowing his eyes. Once or twice his glance found Kalynn in the entranceway. She smiled encouragement.

Then it was done. Eb raised his head. "My lord?" he said with a glance over his shoulder.

"Proceed," His Lordship said.

Eb turned to Isak. "You claim to be a scribe. How did you learn the craft?"

"My teacher was Lurgien, in the village Remoss. I do not think you would know either."

"I do not. He was your father?"

"No," Isak said. "My father was a sea hunter. One voyage his boat did not come back. I was still young. I had no harpoon and felt no calling to the sea. My mother lacked resources to provide for me; I was all she had that was worth selling. Lurgien bought me for apprentice."

"Hmm," Eb said. "And the village? Its fame has not reached me."

"I would be surprised if it had," Isak said. "It is small. When I kept the records there, it numbered eighty-six households. Its Temple was only one man, Lurgien, who served his gods both as priest and scribe. He was old. His eyes were not good. He taught me, that my eyes could see for him."

"Still you have not told me where," Eb said.

"I had not thought—" Isak began, but broke off as Eb's brow tilted upward. "In the province Periphal, where the Lesser River divides among marshlands to enter the sea. Remoss stands on the south bank of the second from the north branch, which is known there as Haven Passage, because of the shelter it gives from storms. It did not shelter my father."

"Thank you," Eb said in a tone that contained scant gratitude. "You come from far away."

The remark had the sound of a question. "Lurgien was old, as I have said," Isak explained. "When he died, my bond was severed. Until a new priest came from Taramuth, I did his work. Already I had been doing it for almost two overtakings; Lurgien was not able. The new priest was young. He did not need my help. By then I was nearly grown, and I had no close kin living. I journeyed seeking a place that had use for my skills. In the end, I came to Center and took service at the Shrine of the Narrow Streets District. The rest I have told you."

Eb rubbed his masking scarf against his jaw. "It could be as he tells it," he told his lord. "In the distant provinces, especially the poorer ones, fosterlings have thus been used. The scribes that come of such a teaching are an indifferent lot—less skilled, as a rule, than the product of a scholarium. But some are competent enough."

His Lordship grumped a skeptical sound. "Do you believe him?"

"I neither believe nor disbelieve, my lord," Eb said. "All he has said does not conflict with facts we know, which means only that he knows those facts also. Only his prophecy stands as a thing of strangeness. And, as you know, my lord, prophecy is a thing men may fruitlessly argue. Only the gods know the truth of prophecy until it pleases them to give us the event. Or give it not."

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"I do not claim a prophecy," Isak said. "Only a foretelling."

"Such things as you foretell, it makes no difference," said His Lordship. "I call it prophecy."

"Explain it to us," Eb said.

"The Council of Brothers, when I told them, did not understand," Isak said. "Can I hope that you will comprehend, when they did not?"

"Perhaps we are not so much in awe of accepted belief," His Lordship said. "Perhaps we stand to lose less if they are shown false. Do your best."

Isak closed his eyes. He took a deep breath. "I must begin with basic things," he said, and sought in his mind a point where he could start. "One of my duties at each shrine I have served has been to keep a record of the courses of the gods across our sky, for it is how they share our sky that gives foreknowledge of the tides, the depth and span of seasons, the flow of the Great Rivers; all the things that touch and shape our lives. At least, so we are taught. At first I sensed no order to their coming or departure, nor did I think it strange. I saw no reason why there should be order, and did not think about it. After all, the gods are gods. But then—it was while I was still bound to Lurgien—I began to feel there was a pattern. There were . . . oh, many things that said to me the gods cross our sky according to a plan."

"A delusion that afflicts many young scribes," Eb said. "Sometimes I think the gods amuse themselves, deceiving them to that foolishness."

"Do you say there is no plan?" Isak asked. He hadn't meant it to sound like a challenge, but even to his own ears it had that sound.

"None of those hatchlings has found one," Eb said. "They produce schemes which seem to fit what is observed, but before a single round of overtakings is complete, we find the gods have gone their own way. It is not in human powers to describe the way of the gods."

"Yes," Isak said. "At first I made the same mistakes. But when I found the gods would not hold to the pattern I thought I had found, I did not let myself be discouraged. I felt still that there was a pattern, though perhaps one more complex than I had believed. I searched records going back through many rounds of overtaking. It was difficult. Some were badly kept. Others, I think, were not correct. And they had been kept for purposes different from mine. I can understand why all the others gave up, or did not try."

"Do I infer," Eb asked, "that you claim you have found a pattern? One that none before you found?"

"I believe that I have," Isak said.

Eb studied him with searching eyes. "My lord," he said at last, turning to the man behind him, "this hatchling is a charlatan who thinks he speaks to fools."

"He's not." It came quickly, impulsively. Kalynn's voice.

"Be quiet, daughter," said her father.

His Lordship placed a hand on Eb's shoulder, light but firm. "Let us not judge too hastily," he said. He pointed to Isak. "You, hatchling. Will you tell us your secret?"

Isak swallowed. The chamber had become unaccountably cold, and he was terribly aware that they were not in the presence of the gods. "I would want to,

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my lord," he said. He tried to speak with a boldness he did not feel. "I would be judged by that, which can be tested by things outside of us, instead of being measured against what is presently believed."

"Do not tell us how to make our judgements," His Lordship warned.

"No one taught at my scholarium would have said that," Eb said. "That much, he tells truth."

"Would the Brothers seek his death for that?" His Lordship asked.

"For that alone, I think not," Eb said. "Joined to other things he's said, perhaps. Especially his presumptions on the gods."

"So perhaps all his tale is true," His Lordship mused.

"I did not say that, my lord."

Again His Lordship touched Eb's shoulder, holding him quiet. "Very well, hatchling. Explain your thinking."

It was this man he had to convince. Isak saw it with a sick feeling of hopelessness. The man knew nothing of a scribe's methods, nothing of how knowledge could be gleaned from the endless tabulations of the gods' flight across the sky. Well, he could only do his best.

> *Damn the Solar System. Bad light; planets too distant; pestered with comets; feeble contrivance; could make a better myself.*
>
> *—Francis (Lord) Jeffery*

"I would begin with how we measure time," Isak said. He watched His Lordship for the first signs of incomprehension as he talked; it would be hard with only the man's eyes and hands in sight, and only his hands not in shadow. "We have the passing, which is the duration of a god's flight across our sky, and we have the anti-passage, which we have always taken to be a similar length, and which is the time between the moment when a god has gone under the world to westward until he has reappeared again in the east. Those are for short durations. For long durations we have the overtaking, which is measured from the time when one of the other gods has moved past Blazing Alpher in their flight across our sky, through the round of seasons until, having outdistanced Blazing Alpher and for a time not sharing the same sky with him at all, he rises in the east before Alpher has gone down in the west and, passing after passing, has narrowed the space between them until at last he overtakes him again. Of course there are also the lesser 'takings, which do not involve Alpher, and those of the Pale One which are more numerous and also different from those of any other, but—"

He saw the restless clench of His Lordship's fingers. There was a space on His Lordship's right index finger that had a pallid scar-tissue look; a place where a ring was normally worn but where there was not one now. It told him much; very few would publicly make claim to noble ancestry. Isak thought of the castle across the river with its ruined wall, and wondered.

"But they would needlessly complicate the present discourse," Isak said. "I—"

"Yet, hatchling, you complicate it yourself," His Lordship said. "You

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have told us nothing we did not learn as children."

"Not yet," Isak said. "I—"

"My lord," Eb said, "it shall be his own tongue that betrays him. Let him speak."

"In discourse of this kind," Isak said, though his fear was very real, "one begins with what is known by all and not disputed, does one not?"

"True," Eb said, annoyed. "Proceed."

Isak touched his brow. He hoped they would be patient. They had so far to go. "Thank you," he said. He took a deep breath and plunged on. "I should mention also that both a god's passings and his 'takings will overlap with those of the others by awkwardly proportioned fractions that continuously change. And each of a god's passings is separated from the ones before and after by an interval—the anti-passage—which is difficult to measure by ordinary methods, so neither is very useful for exactly measuring long reaches of time. And that, I would tell you, is what has been needed to understand the pattern of how the gods share our sky. Further, I have discovered that these measures are misleading, for although they are very similar, neither the passing nor the overtaking of one god is exactly equal to that of another. Even if you consider those of only one god, a particular passing or 'taking will not be equal to the one before or the one that comes next. The same is also true for the anti-passage, nor are a god's passing and subsequent anti-passage as similar in duration as we have thought. Therefore, for the purpose of discovering a pattern, those methods of measuring time are useless."

Eb humphed. "No one has ever claimed that any of those were equal."

"I know," Isak said. "But neither has anyone given much thought to the fact they are not."

"So? Does it matter?" Eb demanded. "They're sufficiently similar that it makes no difference. We're able to arrange our affairs by those measures to the satisfaction of all. What more is needed?"

"Isn't it enough to know they are not true measures?" Isak asked. "Would you accept, buying cloth, less than the length and width agreed upon? Or wine, a cask of unspecified size?"

"Eggs and melons I buy that way," Eb said. "A particular passing or 'taking is the same for everyone."

The flesh of His Lordship's brow was beginning to shape a scowl. "I will admit," Isak said, "for ordinary purposes the differences I discovered are not important. But to understand the pattern of the gods—their flights across our sky—then they become significant."

Again Eb snorted. "If there are differences—and, mind, I say *if*—how did you find them?"

Inwardly, Isak sighed. This was a part he couldn't hope to explain to His Lordship. He might not even be able to convince Eb he spoke truth. It depended on—

"Do you know of the discoveries at the Scholarium of Filorna, of the remarkable properties of a weight that swings on the end of a cord? That neither the size of the weight nor the width of its swing is important? That only the string's length affects the duration of its course from one extreme to the other?"

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"I have heard of it," Eb said, but the words had scorn in them. "An intriguing bit of lore, if true, but useless. Or do you mean to claim the gods are similarly attached to strings?"

"I do not claim to know the nature of the gods," Isak said. "No more than any man. But it is not useless knowledge. This characteristic of the pendulum makes it possible to construct a machine to measure time, independent of the passings of the gods."

"Only if true," Eb said.

Isak appealed directly to His Lordship. "My lord, I have myself experimented with these artifacts. I tell you, the discovery is true."

His Lordship leaned down beside Eb's ear. "Have you . . . ?"

"Of course not," Eb said. "Until this charlatan invoked their claim to justify his own—which he has not yet done—it would have been a waste of effort."

"I shall have to ask you, now, to do it," His Lordship said. "Though it sounds suspiciously of magic."

"Perhaps some influence of the gods, not previously known?" Isak suggested.

"Umm," Eb muttered, displeased but reluctant to argue.

"Well, hatchling?" His Lordship prompted.

Isak swallowed again. "My lord, given a machine to measure time, it is possible to gauge the passings of the gods against a scale that is apart from them, which therefore provides a true measure. It was lack of such a measure that prevented a pattern from being discovered long ago."

"So you would claim no revelation? No special favor of the gods?"

"None, my lord."

"And any man could come to your findings?"

"If they were sufficiently curious, and willing to do the work," Isak said.

It seemed to trouble His Lordship. "No favor at all?"

"My lord," Isak said, "I am sorry. In all of this, I have not felt the touch of the gods."

"Then can you say why you are alone in your discovery?"

"My lord," Isak said, "I do not claim to be alone. I do not know of others, but I do not say they do not exist."

"You see how clever he is in argument, my lord," Eb said. "We shall not find truth by discourse with him."

"Nor in blind disbelief, either, my lord," said Isak quickly. "I do not ask you to believe me, but only to hold back judgement until your man has done his investigations. If he is truthful, I have nothing to fear."

"Fear nothing, then," His Lordship said, "so long as you can say the same for yourself."

"Enough," Eb said, raising a hand. "In time, we'll know who speaks truth. Now, do I think right, that you base your prophecy on this pattern you claim to have found?"

"Any man, knowing the pattern, could foresee it," Isak said.

"You say this, even knowing that always at least one of the gods stands in our sky? That they have watched since the time of the first men?"

"I know that," Isak said. "But also I know—the pattern tells me—when the moment comes, Actinic Gamow shall

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stand alone up there, and he shall pass behind the Pale One. For a time, she will block his sight."

"Ah," said Eb. He leaned back, looking upward. "And that is it? That is the whole of it?"

"It will be a time of darkness," Isak said. "Yes."

Eb still was not satisfied. He still had questions. He wanted to know why Isak thought the Pale One would pass in front of Gamow rather than behind, and whether it would make a difference, for the Pale One gave the appearance of a cloud, and a thin one at that, and it was well known the whole sky could be masked with cloud without blinding the sight of the gods. Isak nodded; they were reasonable objections. He had pondered them himself. What had settled his mind was the record he found in the Archives from Kagglan, a village far southward, on the shore of the South Ocean, of a time when Alpher overtook the Pale One, passed behind her and watched the world, as it were, over her shoulder. The scribe's telling, which even on parchment shrieked of fear, told how Alpher had appeared to have had a bite taken from him, and his heat was less, his light was strange, and the fear had been great that Alpher was destroyed; but when next they rose in the east Alpher had moved ahead of the Pale One and was restored to his full, blistering roundness. He had suffered no harm. At the same time, a village not quite so far south, though a great distance eastward, had reported the event as an almost normal overtaking, but one in which the edges of the two discs appeared actually to touch. The priest of that village had sent to inquire what such a happening could portend. From those records, Isak drew two conclusions: that the Pale One's body was a solid thing through which a god's light did not shine, and that the Pale One's course of flight lay much nearer the world than Alpher's.

Eb had trouble understanding the second point. "Look at me," Isak said. He held up a hand at arm's length in front of his face. "Lean aside, either way, and look at me again. Do you see? When you look from the side, you can see my face. When you look directly, my hand is in the way. Now . . ." He brought his hand closer until the palm was against his nose. "Now, no matter how far you lean, my hand blocks your view. Therefore, I conclude the Pale One is much closer to our world than Blazing Alpher. It is a thing you learn, watching boats on the river."

"Perhaps," Eb snapped. He seemed annoyed. "But is she nearer than Actinic Gamow? That, after all, is what your prophecy must have."

"It is only a foretelling," Isak reminded him.

Eb's hand chopped air with a force that would have cracked stone. "Call it what you will. You cannot speak of one god, then say the same is true of another unless you have proof."

He was right, of course. Isak nodded. "I have studied the Pale One's aspect through many configurations. Once it is known that she is not a wraith, but solid, and that Alpher is more distant, it is not difficult to understand her shifts of hue. It is most apparent when Red Bethe or the Twinned Ones let her share their sky. Then—it seems a paradox, but I am sure it is not—the face she

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turns toward us is most pale. Almost white, and with the streaks across her face very hard to see, especially when all the red ones stand close to her, except that her edge on the side toward a red one has the color of blood mixed with water that her whole face shows at other times. When the red ones are farther apart from her, more of her face is reddened. I have watched the play of color on her face, and I have come to believe she is a sphere, and that she is nearer to our world than any of the gods; that when the red ones all stand close to her and only her edges show redness, it is because their light falls mainly on the side of her that is turned away from us."

Eb held up a fist to the lamp's light. He studied it, shifting his head to look at it from one angle, then another. "Ummm . . ." he grumbled. He had grasped the idea, but he did not like it. "And Gamow?"

"His sight is not as brilliant as Alpher's nor as easily distinguished," Isak said. "But in certain advantageous configurations I have seen the edge of his light on the Pale One's rim. It could be none other's. So I am certain that, when the moment comes, the Pale One shall mask our world from his sight."

Eb cocked his head. "And you say the Pale One is solid," he mused. "Solid things have weight. Can you explain what prevents her from falling out of our sky?"

"I do not know," Isak admitted. "Perhaps the gods will that she does not."

It brought a harsh bark of laughter. "Very well," His Lordship said. "You—" His hand touched Eb's shoulder. "—You shall investigate these things he has claimed."

"I intend to, my lord," Eb said. "If only for my own satisfaction. For now I will say only that never before have I been told so many preposterous things I could not instantly disprove. He is a very clever young man."

"If I were clever," Isak said, "would the Brothers not have believed me?"

"Perhaps they did," His Lordship said, "but feared you."

"What had they to fear?" Isak wondered.

"I have another question," Eb said. "You say you believe the Pale One is shaped like a ball, and that you have seen the light of the gods illuminate a portion of her face while shining mainly on the side of her that is turned from us. If that is true, it should be possible to measure the angle from which the gods' light shines on her, and from any shadow post you could measure the angle from which that same god's light comes to us at that same moment. From that information you should be able to determine that god's distance from us."

"In comparative terms," Isak said cautiously. "His apparent distance, at least. Theoretically, at least, it is possible."

"Have you made such calculations?"

Was it a trap, Isak wondered? Certainly it was a subject about which there was much argument and many conflicting opinions. But his only hope of safety lay in speaking truth. "I made an attempt," he admitted. "You must understand, to measure the light on the Pale One's body is difficult. I could not do it with great accuracy. And even a small difference in the measurements

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would cause a large difference in the numbers produced."

"But you attempted it. What did you find?"

"The numbers were so large I could not believe them," Isak said. "Thousands of times the distance between us and the Pale One. Many thousands, and for some of the gods it was millions."

"Not infinite?" Eb asked. It was what most men believed; those who thought about it.

"I would have felt less disbelief if it were," Isak said. "At least that would be consistent with them being gods, but that is not what my calculations produced. Perhaps it is among their powers—did you think their powers are limited to those we have perceived?—to give the appearance of holding whatever distance they wish; certainly, if those distances were real, it would be cause for us to feel awe. There is not so much distance in the universe."

"Faugh," Eb snorted. Even the set of his shoulders seemed a sneer. "And you say that for each the distance is different?"

Unhappily, Isak nodded. It was contrary to common belief and possibly to common sense as well. But that was what his calculations had found. "As I have said, I put no faith in it. It is only the appearance that they give. But I must say also I repeated my measurements many times, and while my calculations from each set of measurements did not produce exactly the same result each time, for each of the gods except Red Bethe the distance was always so close to the same number that small errors in my measurement would account for the discrepancy. And for Red Bethe, whose distance I must admit was never the same twice, I discovered it was different each time in a way that was consistent with the change he displays in his apparent size and warmth and brightness. I do not know how much of what I found is truth, nor how much is only an appearance they assume. Nor, for that matter, do I know how much I may have erred merely because they are gods and therefore beyond our understanding. But I know that not all my measurements could have been incorrect, nor could I find any flaw in my calculations. Therefore I must say that, though I cannot believe the numbers, the appearance of distance they have given is a true appearance. I did not imagine it."

"And your assumptions?" Eb demanded. "You did not question them?"

"I did, learned one. I did," Isak said quickly. "Did I not say I put no faith in the numbers? I have not been able to find my error, but could any man if the gods would deceive him?"

"And yet you feel no doubt that you have discovered a way to predict how they will share our sky?" Eb asked. His bony finger skewered air. "If they have deceived you in the matter of distance, why not also in that?"

"That I can directly observe," Isak said. "I have done it since I was a boy. In that the gods cannot deceive. Perhaps I should say also I would not have looked into the records from Kagglan, had not the pattern shown me it was there that the Pale One most recently might have been seen to pass across a part of Blazing Alpher's face." He hesitated. "Such things do happen. Kagglan was only the most recent time.

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There have been times—they are in the Archives—that Alpher has passed completely behind the Pale One's body, and sight of him was completely lost."

"And was there darkness then? Would not such an event be remembered?"

"Other gods stood in the sky," Isak said. "They watched while he could not. Have you noticed? Alpher never stands alone in our sky. Always at least one other is with him."

Eb's head came up. For a moment he was wordless.

"Is that true?" His Lordship asked.

Eb clamped a hand on his knee. Almost imperceptibly it trembled. "My lord, I can think of no occasion when it was not true." The words came tart and angry. "I shall investigate."

"I think also," Isak ventured, "Kagglan must be several leagues farther south than has been thought. I had expected they would have been seen barely to touch."

His Lordship bent close to Eb's ear. "That distance. How well is it known?"

"A distance such as that is a guess," Eb said in an edged voice. "A measure of the provisions a caravan must take to journey there; the straightness of the road, the difficulties on the way."

"Could he have known that?" His Lordship asked.

"It is well known, my lord," Eb said. "The strange thing is that he would claim to have a different way to measure."

"But if the Pale One is nearer than Blazing Alpher, it is obvious," Isak said quickly.

"To you, perhaps," Eb said.

"Enough," His Lordship said. He spoke to Eb. "He has told you more than you need to discover if he speaks truth, or whether—as you say—he is a charlatan. You shall do that." His glance returned to Isak. "You, hatchling. One final question. Tell us when this darkness shall come."

"If it ever does," Eb grumbled.

His Lordship thumped Eb's shoulder with a hard, stiff finger. "Hatchling?" he commanded.

Isak hesitated only a moment. It was a temptation that His Lordship might be more persuaded if he gave it in the vague phrasing common to prophets. But it would have been less than full truth, and his greatest hope lay in being different from any prophet ever known.

"Between that time and now," he said, "Actinic Gamow will overtake the Pale One only once. On that occasion, Red Bethe will stand low in the west at the moment Gamow is abreast of her centerpoint, and at that time the space between them will be less than the breadth of your thumb held at arm's length. The time after that, when he overtakes her, he will pass behind her. She will block his sight, and Bethe shall have gone below the horizon, nor shall any other god stand aloft. There will be a great darkness."

"So you say, hatchling. And before that moment, how long do we have?"

It seemed a question to which he'd given the answer already. "Why, the interval between one 'taking of the Pale One by Actinic Gamow is always the same to the limits of my power to measure," he said. "It is . . . oh." He'd been thinking of his own scheme of measurement, not the ways of common usage.

"How long in words that I know?"

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His Lordship said.

"It is not easy to convert to ordinary units," Isak said. "As I have told you, the ordinary units do not indicate equal durations. But, as nearly as I can, I would say the time between one 'taking of the Pale One by Actinic Gamow and the next would be forty-two and four-fifth's of Blazing Alpher's passings. Sometimes it is a little more, sometimes less."

"And the time between now and the next overtaking?" His Lordship asked.

"Why, that would be . . ." Isak began, and stopped. "My lord, I cannot answer that. I do not know how long I have been in this hiding place, so I do not know the moment I should measure from."

His Lordship looked back over his shoulder. "Mistress Kalynn?"

"I do not know, my lord," she said. "When he came, I did not note how the gods were standing. I was thinking about other things." She raised her voice. "I'm sorry, Isak."

Isak's gesture said it didn't matter. "What I need to know is how the gods now stand. If you could tell me . . ."

"Did you note?" His Lordship asked Eb.

"I had no reason to, my lord."

"Nor I," said Palovar.

"Please." Kalynn's voice. "I could find out."

"Do that," His Lordship ordered.

Isak glimpsed her as she moved back into the entranceway. "I need to know which gods stand aloft," he called after her. "And what parts of the sky they hold. Read the shadow post."

She paused, half-turned. "The shadow post?"

"In the garden," he said. "I want to know how the shadows lie around it."

She fluttered her hands. "Why, as the gods cast them, no different from ever. What more . . ?"

The idea that meaning could be found in the fall of those shadows was strange to her. He shrugged. It would have helped, but he could do without. "Tell me how they stand," he said. "But the Pale One. I must know about the Pale One."

"What should I ask?" she wondered.

"I must know how she stands, the same as for the other gods," Isak said.

"Oh." She backed into the entranceway. "Is she a god? She is so different from the others."

"Enough," His Lordship said and slapped his knee. "Make your inquiries and come back."

"I'm sorry, my lord," she said meekly. "I'll try, Isak." Then, half hidden in shadow, she was at the opening and talking to someone outside. Impatiently, His Lordship shifted his weight. "Knowing that," he said to Isak, "you can tell us how long?"

Was it so strange? "Certainly, my lord," Isak said. "If the Pale One is aloft, I need only to know how the gods stand relevant to her. If she is not, I will know which gods she does not stand among, and from that it should be possible to estimate when she will rise and how the gods will stand at that time. Although," he added, "if I must estimate, I cannot hope to be as accurate."

Kalynn came back. Her father made room for her to pass and she came on as far as she could. She knelt behind His Lordship, so close she could breathe

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on that one's shoulder. "Isak, Hobur says Red Bethe stands low in the east with Bright Dalton above him, very near. He believes it is the Twinned Ones whose light comes from the west. He can see no others."

Isak nodded. "Yes. It would be the Twins." But then he frowned. He scratched some marks on the hard earth at his feet. It was difficult to keep track of all the facts at once. "And the Pale One? Is she . . ?"

"He did not speak of her," Kalynn said.

"But there are clouds? You said he was not sure it was the Twinned Ones."

"Yes," Kalynn said. "There are clouds halfway up the sky. They cover all the west and part of the south. I'm sorry, Isak."

"You've done as much as you could," Isak said. And, to His Lordship, "I believe the Pale One is behind those clouds, or else only lately gone down. If I knew her height, I could say with more certainty, but I believe Actinic Gamow will overtake her in no more than twenty-seven of his passings, nor less than twenty-three."

"That's not very exact," His Lordship said.

"Any man could make a guess such as that," Eb said. "It is easily within the limits of short-term variation."

"I made no special claims," Isak said. "But I did not know how long I have been here; for part of that time I was not conscious. It could have been less than a passing; it could have been five."

"Or more than five," Eb said. And, over his shoulder, "My lord, he is guessing."

"It could not have been more than five," Isak said. "I would have felt more hunger. My throat would have been dry."

His Lordship spoke to Kalynn. "You've said nothing to him about the time he's been here?"

"Not that I can remember, my lord."

"And your servant? Might he have said . . . ?"

"I do not know, my lord. We did not know it would be important. Should I ask?"

His Lordship was gesturing the question aside when Hobur spoke from the entranceway. "Mistress. The clouds be lifted from the world's edge. The Pale One be up there, but soon to go down."

"You see?" Kalynn urged. "Oh, thank you, Hobur. Thank you."

Isak had half risen. "Have the Twinned Ones overtaken her?"

"Aye, those two be standing below her, lad," Hobur said. "Though she yet nip their heels. I'd not gamble it be fully done."

"If not, it will be very soon," Isak said. He knew now where he was in time. "Before they go under the world."

"You know that?" His Lordship demanded.

Isak nodded. "As surely as I knew she would be in our sky when I learned Blazing Alpher was not. At least—" He had to speak truth. "—I thought it likely."

His Lordship turned to Eb. "Could you have been so sure?"

"A conjurer's trick, my lord," Eb replied with a belittling wave of the hand.

"Conjurer's tricks done with the gods?" His Lordship demanded. His

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glance went from his man to Isak, then back. "What other powers might one have, who could do that?"

"The power to confound with a glib tongue, my lord," Eb said. "Were my life at stake, I too would clutch at chance and do my utmost to deceive. I must advise, my lord, apply great caution in your dealings with this creature."

"I have never thought otherwise," His Lordship said. He twisted around, rising, careful of his head under the ceiling beams. To Palovar he said, "My scribe will have much scratching and thought to consume him. Myself also. But you judged right: we may have use of him."

"My lord," Palovar said, touching his brow, "it was my daughter who suggested . . ."

But His Lordship was not listening. He gave Eb a nod that sent him scuttling into the entranceway. Turning again, he studied Isak for a long silent moment before he too turned to go.

Kalynn edged into the space they had vacated. She reached for the bowl and the serving board. "It's gone cold," she said. She meant the food. He'd forgotten all about it. "I'll get you more."

He caught her wrist before she could touch the board. She tried to pull away and he could see the alarm on her face. "Please," he said, feeling hurt that he had frightened her, and carefully turned the board so the light would let her see his marks. He heard the sharp catch of her breath.

"I think I could get some waxboards," she said. "Would you like that?"

"Could you?" he said.

She looked down at the bowl in her hands. "I could try."

He nodded assent. "But if they must come from outside, be careful. No one must see them. They would mean you have a scribe inside."

"Oh, that's right," she said, touching her cheek. It was something she hadn't thought of. "We'll be careful."

For a long moment, then, she studied him closely. She touched his arm. "I never met anyone like you," she said, awe in her tone. Quickly, then, she backed away, turned. "Are you really a prophet?"

But before he could answer she was gone.

Much may be made of a Scotchman if he be caught young.
—Samuel Johnson

She came back with food and lingered while he ate. A chunk of roast sliced on a board, boiled yams, a jar of wine. Threads of steam drifted upward from the meat and the yams. For a while she only watched. Finally, softly, she asked a question. Then another. After that one, more. They were casual questions, sparked by random curiosity more than any need to know. Having never herself ventured more than a few leagues beyond the city's edge, she asked about his wanderings, the towns and villages he'd known, the mountains, the Great Desert—of the delta village where he was born, where he had lived his first twelve rounds of 'taking. He told how he had left it on a skin trader's barge; how a caravan crossing mountains and tundra had left him in

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a village so far to the north that for a whole season almost the only god to hold the sky was Actinic Gamow, but Gamow watched all the time, dipping close to the ice-choked sea in the north, circling high to southward. Though giving light, he yielded little warmth. Sometimes the Pale One shared his sky. She gave no warmth, either. When at last Blazing Alpher peered above the southern horizon, showing only an edge of his disc, the people celebrated.

From there he drifted southward. For a time he served a grain buyer in a town where the Temple priests saw portents of a bountiful harvest. Watching how the gods shared the sky, Isak felt doubts; Red Bethe had been slow to depart from Alpher's sky that spring, and as the season advanced the shadows he laid became longer and longer while Alpher's grew short. He warned his employer, who laughed.

As the time of harvest came near, the heat, instead of waning, deepened. The wind was hot. Crops withered. Dust storms blackened the sky, concealing that land from the sight of the gods. When the second storm came, the people killed the priests who had given false counsel. When the third storm came, people began to leave, still wondering why the gods had shut their eyes to them.

Isak joined the exodus. He saw deserts, a vast arid gorge with a river twisting through its depths, mountains where deep snow lay with a cold white brilliance under the gods and all the higher peaks were forever shrouded in cloud. Once, after a particularly gruelling trek, he was so exhausted that he lay down on the turf beside a stream and actually slept—a sleep so deep that he knew nothing, and that lasted almost the full duration of Bright Dalton's passing. It was a thing which had happened to him only two other times in his life. He wondered if sleep was possibly something like death; if it was, he did not like it.

For a full round of 'takings he lived in Filorna, having gone there in the hope that, at the Master Scholarium, he could receive more thorough instruction at his craft. Many times when he had sought employment he had seen the frown when he admitted his indifferent schooling, seen the frowns darken to scowls when, pressed but speaking only truth, he was compelled to explain that, though no scholarium had endorsed his proficiency, his skill was equal to that of any youth who came from those schools. He was disappointed, though; Filorna's syndics judged him half taught and therefore unteachable. But he was not disallowed from visiting the library, said to be the best anywhere, and some few of the junior scholars were not unwilling to converse with him. In time, he came to know several well, was welcome in their quarters; sometimes, even, he found himself participating in their discussions almost as an equal. Proud as boys, they showed him their discoveries. Once, asking a question, he realized it was something they had never wondered about; he saw them glance at each other, saw them look at him, then, with a different look in their eyes. It was the most exciting time of his life, filled with the euphoria of new things learned.

Through that time, he supported himself at scribe's work for several small

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merchants. None of them, alone, could have mustered even a scant scribe's pay, nor had they, individually, that much need for one. Combined, they provided sufficient work to justify a meager wage. He would have taken his pay in bread crusts, ditch water, and bones if it would have let him stay in Filorna, but such a time could not last. The syndics became aware of him, and thought him a disturbing influence on the placid function of their school. In that they were wrong; long before he came, the younger men had been adventuring into far realms of discovery. He was little more than a watcher beside the flame.

Nevertheless, he was suddenly barred from the library, from the quadrangle, and from the private quarters. Soon after, the merchants—some of whom depended heavily on the school for their business—discharged him. Nor could he find others who would give him work or wage.

He became a wanderer again, but with a difference. Before, it had been the aimless travels of one who went where the caravan track might lead; now he journeyed in search of knowledge. He went south—as far south as a caravan would take him in trade for his work along the way. In the villages where they paused he visited the Temples, spoke with the scribes. More times than not, they let him search their records. What he found seemed to confirm his expectations; for already he believed he had glimpsed the pattern by which the gods apportioned the sky.

From the town where the caravan left him, the river Leeth coursed west through a gorge in the Stone Mountains. Isak found passage on a trader's flatboat. He swung a long, heavy sweep, helping to steer the awkward, fragile craft, while around him the water roared and burst into fountains of spray. Once, thrown overboard, he came near to drowning. It was far different from the smooth, deep-running water he had known as a boy.

Beyond the mountains, the river curved north. There were towns, sometimes on one shore, sometimes the other, where they paused. The trader conducted his business. Isak visited the Temples. Also, as they traveled, he made notes of his own on how, with each successive passing, the gods shared the sky; what gods stood aloft, and what part of the firmament each one held, when the next came above the horizon; and similarly how each stood as each in turn descended from sight in the west. It was not possible, aboard a wallowing water craft, to carefully measure the length and compass-point of each god's shadow at such moments; but, except when the river was at its most tumultuous, he was usually able to make rough measurements of the angles between those shadows. The trader watched him with dour skepticism—thought him unbalanced—but said nothing. Isak compared his notes with Temple records in the towns. All facts fitted the pattern.

Though it curved and twisted and changed course a thousand times, the river maintained its northward trend. Isak could see it in his notes and his calculations. At last it joined the Great Western River under high, frowning bluffs. Isak had never seen a city so large. There the trader beached his craft for the last time, to market his accu-

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mulated wares and let the boat be salvaged for its timber. Isak continued his journey downstream, burdened now by a heavy bundle of notes, eventually to come to Center of the World where the Supreme Temple stood. There in its Archives would be the final evidence, the proof that would affirm or refute his surmise. And there he found it.

Eating and, at the same time, talking made both a slow process. Before he was done the meat was cold and the wine had warmed. He hardly noticed either. He noticed only that Kalynn listened with eyes half closed. It seemed a long time after he stopped talking before she opened them.

"But you're hardly older than I am," she said.

"I was born in a different place," Isak said. "And to a different station in life."

"I've always wished I could see other places. You—you've seen the whole world."

"Only part of it," Isak said. "If I can accept what I found in the Archives, I have seen not a tenth of it. And all my life I have wanted a home that was mine."

"But to have seen all those places!"

"Even the river trader had a home where he went between journeys," Isak said. "To be a wayfarer is a . . . a very desolate way to live."

She began to gather up the utensils. "I shouldn't have stayed so long," she said, not looking at him. "Father will be angry if he finds out. Hobur probably already is." Clutching the dishes awkwardly, she made to rise.

Isak took back the serving board. He could use it for note-making. "I should

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not have talked so much," he said.

"I wanted you to," she said. For just a moment she looked at him, honest-eyed. She touched his hand. "You're nice to listen to."

By then she was on her feet. Between the ceiling beams she could stand almost straight. "I'll bring the waxboards as soon as I can. Maybe I can get some parchment too. I think Father has some at the trading yard. Would you like that?"

Even better than waxboards. "I would need ink and brushes also. But, yes, I would like parchment very much."

"I'll try," she said.

He helped her climb down into the outer chamber, aware of Hobur's suspicious eye watching him, and handed down the utensils one by one. Again she tried to stack them, failed, and let Hobur take part of the load. For the space of half a breath he wondered whether, if he leaped out now, he might escape them before they could put their encumbrances aside. But he knew nothing of what lay outside this outer chamber; couldn't see, even, where its exit was. And, oddly, to make such an attempt would have felt like a betrayal. She had said she would bring him parchment. While he hesitated, the moment passed.

Though she was looking up at him, she could see none of his thoughts. She arched an eyebrow at him and gave him a sidelong smile which he didn't quite know the meaning of. Then she was turning away and Hobur, his burden set down on a dust-filmed chest, was advancing to lift the first stone into place. He found himself hoping she would come back soon. ■

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END OF PART ONE

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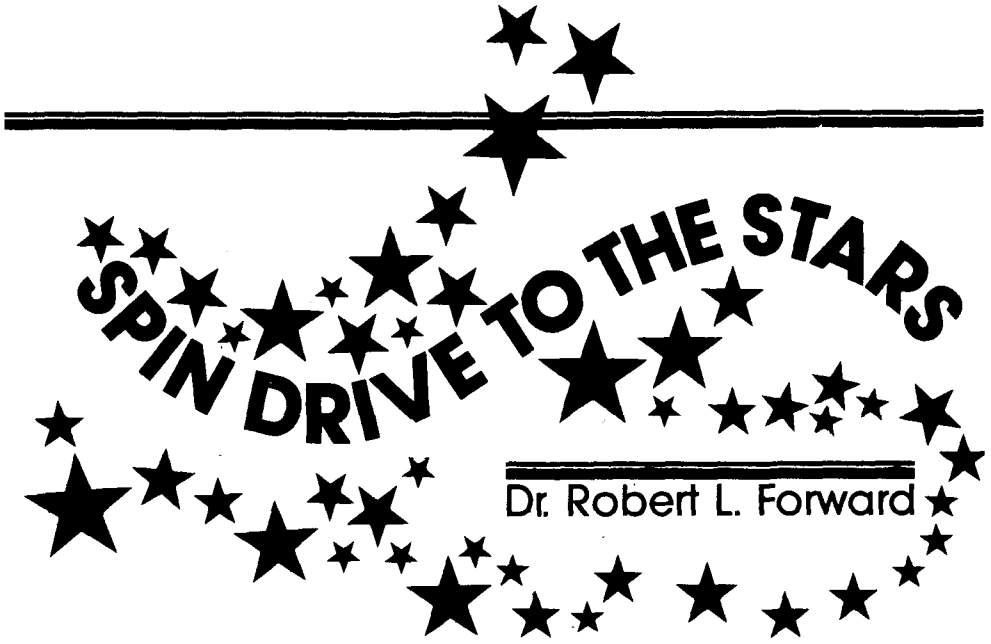

No, this won't tell you how to build one— but it may give somebody an idea where to look!

Practically everyone at one time or another has held a gyroscope in his hand and watched it perform its miraculous feat of levitation. With one end sitting on your finger, the rest of the gyroscope balances out horizontally and slowly twirls around, its center of gravity far out away from its single support point—yet it does not fall! Practically every space enthusiast in his early years, Goddard and Von Braun among them, has felt that there *must* be some way to remove that one support, yet still have the gyro (or gyro complex) continue the levitational feat, drifting slowly upwards to the stars. Yet, as each struggled with the concept of a gyroscope space drive, all were forced sooner or later to realize that it would not work. They were beaten by nature's conservation laws.

The law of conservation of energy is not the problem, for a rapidly spinning gyroscope certainly has enough energy to lift itself a considerable distance in the Earth's gravity field. No, it is one of the other conservation laws. The law of conservation of linear momentum.

If you start an experiment with a gyroscope sitting motionless on the surface of the Earth, and you end up with a gyroscope moving upwards in the sky with a finite velocity, then by the law of conservation of linear momentum, some other mass must be moving

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in the opposite direction. The upward moving gyro must have had something to push against, like your finger.

The wheel of a gyroscope is spinning furiously. Certainly there must be a way to use that circular motion of the wheel to produce an upward motion of the whole gyroscope. Yet, as many a frustrated inventor has found, when model after model refuses to budge from the floor, there is yet another conservation law standing in the way of progress—the law of conservation of angular momentum—spin. But, suppose that the conservation laws of linear and angular momentum were not true laws—just approximations. . . .

Many years ago B.E. (Before Einstein), the world was dominated by four conservation laws: conservation of mass, conservation of energy, conservation of linear momentum, and conservation of angular momentum. The physics textbooks firmly insisted that each was always separately conserved. (Of course, there was that perpetually glowing pitchblende in Madame Curie's laboratory that seemed to indicate that energy was coming from nowhere, but *surely* her measurements were in error.)

Suppose you had taken a scientist of that time and showed him three one-kilogram bricks on a table, one of frozen hydrogen, one of red-hot iron, and one of room-temperature uranium. If you then asked him which brick had the most energy, the scientist would have first noticed that since all the bricks were at the same height in the Earth's gravity field, and they all weighed a kilogram, that their gravitational potential energies were the same. If he then measured the temperature of the bricks, he would have said that the hot brick of iron would have more heat energy than the others, and he could even calculate how far that heat energy could lift the iron brick against the Earth's gravity given an efficient way to convert the heat energy into kinetic energy. Obviously the red-hot kilogram of iron had more energy than the room temperature kilogram of uranium, and the frozen kilogram of hydrogen ice had the least energy of all.

Then Einstein developed the Theory of Special Relativity. Originally developed as a theory to explain what happens to objects when they are traveling near the speed of light, one of the logical consequences of the theory was that the conservation laws for mass and energy were not strictly true! Mass can be changed into energy and vice versa. The thought must have been mind-boggling at first. Mass is measured in kilograms and energy is measured in joules—they don't even have the same units. How

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can you convert one into the other? It would be like turning a sow's ear into a silk purse!

The conversion of mass to energy does take place, however, and the conversion factor is a phenomenally large one, the speed of light—squared! From Einstein's special theory of relativity there comes that famous equation that can even be found in daily newspapers:

$$E = m c^2$$

This equation predicts that if a way could be found to carry out the conversion, a tiny amount of mass will produce an amazing amount of energy—90 megajoules per microgram! Scientists could now understand what was going on in Madame Curie's laboratory. The nuclei in the atoms of pitchblende were changing from one element to another, and giving off energy in the process. The new element weighed slightly less than the old element and the difference in mass showed up as gamma ray or particle energy. The scientists then knew that nature was able to violate the conservation laws for mass and energy, but there didn't seem to be any way by which humans could control the conversion.

Einstein told us that mass could be converted into energy and he even gave us the conversion equation. But it took Fermi to find the method by which the energy stored in the excess mass of the uranium nucleus could be released. The process ultimately proved to be amazingly simple. You just put two or more large blocks of uranium or plutonium near each other and a chain reaction starts, automatically producing heat (or an explosion).

When Fermi and the other scientists finished their experiments and measurements on all the elements and their isotopes, they found that the very heavy elements, like uranium and plutonium, had an excess of mass per neutron or proton compared to carbon, while elements like iron had a deficiency of mass per nucleon. At the other end of the periodic table, the very light elements like hydrogen and lithium also had a mass excess. If the uranium and plutonium could be fissioned into iron-like elements, the difference in mass would be released as energy. In the same way, if the lighter elements could be sequentially fused together to build up iron-like elements, then again there would be an excess of mass that would be converted to energy. The sun uses the fusion process to convert its hydrogen fuel into iron through the carbon cycle, while the interior of the Earth is kept warm by the fissioning of the radioactive heavy elements. The human race is now able to initiate both reactions at will (although the non-explosive form of fusion still eludes us).

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If you were to ask a modern-day scientist which contains more energy: frozen hydrogen, red-hot iron, or room-temperature uranium, you will now get a different answer. For the modern scientist can see energy sources in those bricks that could not be seen before. The frozen hydrogen, if fused to iron, will release more energy than the fissioning of uranium to iron; and the red-hot iron, which used to be thought the better in the energy sweepstakes, is now seen to be comparatively devoid of energy, despite its high temperature.

Thus, the advent of special relativity produced a new energy source and reduced the number of conservation laws. We now have only three: conservation of mass-energy, conservation of linear momentum, and conservation of angular momentum. The physics textbooks firmly insist that each is always separately conserved. (Of course, the rapidly spinning black-hole quasars seen through the astronomer's telescopes seems to indicate that energy is coming from nowhere, but *surely* their measurements are in error.)

Einstein did not stop with his theory of Special Relativity. He next went on to develop his theory of gravity, called the Theory of General Relativity. The Einstein theory is an extension of the Newtonian theory of gravity. In the Newtonian theory, gravity is a force field that is generated by mass. The gravity is the same whether or not the gravitating body is hot, moving, or spinning. In the Einstein theory, gravity is not caused solely by mass, but it is also produced by energy, *and* linear momentum, *and* angular momentum!

The Einstein equations for gravity are tensor equations. Tensor equations are just a bunch of regular equations that must be solved in tandem because the equations interact with each other. The name tensor comes from the word tension, since it was the study of tension and compression acting on elastic bodies that led to the development of the tensor method. When you apply tension in one direction (say the x-x direction) on an elastic rod, the rod not only stretches in the x direction but also necks down in the y and z directions, indicating that you need three equations to describe the response of the body to one tension. To handle things properly in tensor elasticity theory you need 9 equations (3 tensions times 3 dimensions, although some of the equations are superfluous). For the Einstein universe, where time is another dimension, the tensor equations are 16 equations solved together. The Einstein gravity equations describe a tensor gravity field. The source of the gravity is called the mass-energy-momentum ten-

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sor. The non-moving portion of the mass-energy-momentum tensor, or the mass, produces the usual Newtonian gravitational attraction that we are familiar with. The heat and other sources of energy in the gravitating body not only add to the Newtonian attraction, but also produce gravitational stress patterns in the nearby space. The linear momentum portion of the mass-energy-momentum tensor in the Einstein theory that is produced by the motion of the gravitating body generates a gravitational field that is different from the Newtonian gravity. The linear momentum gravitational field tends to "drag" a nearby test mass in the direction the gravitating body is moving. Similarly, according to Einstein, the angular momentum in a spinning body causes nearby falling objects to move in curved paths.

If mass, energy, linear momentum, and angular momentum all produce a gravity field, doesn't that indicate that they are all just different aspects of some more fundamental entity? We have given this entity a name—the mass-energy-momentum tensor—but just naming something does not mean we really understand it.

This multi-aspect appearance of the "thing" that causes gravity in the Einstein Theory of General Relativity is reminiscent of the allegory about the blind men and the elephant. One of the blind men felt the trunk and said that an "elephant" was like a snake, another felt the tail and said that an "elephant" was like a rope, another felt a leg and said that an "elephant" was like a tree trunk, while a fourth felt the ear and said that an "elephant" was like a leaf. They were all partially correct, but none of them could truly comprehend the "elephant" as a whole. Scientists today are in the same predicament. We see various aspects of the mass-energy-momentum tensor, but we still cannot comprehend it as a whole.

Might it some day be possible, just as we can now inter-convert two of those gravity-producing components of the mass-energy-momentum tensor—mass and energy—that some day we can inter-convert mass, energy, and the two types of momentum?

How can that be? They are different things. Yet, with Einstein giving us the equations and the conversion constants, and Fermi giving us the experimental techniques, we found that a room-temperature brick of uranium could give us more energy than a glowing brick of iron. Could there be other sources of energy hidden in ordinary things that we could extract by conversion of linear momentum and angular momentum to energy? What we need are the right conversion equations and the right experi-

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mental techniques.

Suppose we wanted to convert linear momentum to energy. What type of conversion constant do we need? Well—energy is in joules, or kilograms times velocity squared, while linear momentum is kilograms times velocity. To convert linear momentum to energy, we need a conversion constant with the units of velocity. The natural choice is the velocity of light, giving us the conversion equation between energy E and momentum p of:

$$E = p\,c$$

Since the numerical value of the speed of light is so high, this gives us some remarkable results. A one-kilogram mass moving at one meter per second velocity has only one joule of energy in its motion. Yet, if the speed of light is the correct conversion constant, the linear momentum in that motion, *if* it could be converted completely into energy, would produce an additional 300 million joules! (Just stopping the mass will not do. That only transfers the linear momentum to your hand, and thence down to the ground. The linear momentum is not destroyed, just transferred to the Earth.)

But let's go on. To convert spin momentum to linear momentum we need a unit of length. There is a fundamental unit of length, called the Planck length. It is made up of a combination of the Newtonian gravitational constant G, the Planck quantum mechanical constant h, and the speed of light c, and is given by the equation:

$$\Lambda = (h\,G / 2\,\pi\,c^{3})^{1/2}$$
$$= 1.6 \times 10^{-35}\ m$$

The Planck length is very tiny—a trillion, trillion times smaller than the nucleus of an atom.

To convert angular momentum L to linear momentum p, we divide by this tiny number:

$$p = L/\Lambda$$

That means that a very small amount of angular momentum will make a very large amount of linear momentum . . . or mass . . . or energy. The equation for the interconversion would be:

$$E = m\,c^2 = p\,c = L\,c/\Lambda$$

The smallest amount of angular momentum that you can have is one unit of atomic spin—an electron orbiting a nucleus. If we could find a mechanism to convert that single unit of atomic spin, then the angular momentum destroyed could reappear as either 6.5 kilogram-meter per second of linear momentum (a one-kilogram brick tossed through the air), 22 micrograms of mass, or the energy

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of 1/2 ton of TNT!

It may be that some day gyroscopes will take us to the stars. But instead of massive whirling discs of brass or steel, the gyroscopes will be the nebulous whirling particles in the atom. Convert some of those spinning bundles of angular momentum and you will have the energy and momentum that you need to push a spaceship close to the speed of light.

But how do we make the conversion? You don't destroy angular momentum by grabbing a spinning object and bringing it to a stop. When you do that, the angular momentum is merely transferred through your body, to add to or subtract from the spin of the Earth. Unfortunately, we don't have Fermi around to show us how to convert momentum to energy, as he once converted mass to energy with the first nuclear reactor.

Which one of you out there will be our "Fermi" of tomorrow? Which one of you will finally be able to "see" this mass-energy-momentum "elephant" we grope around like blind men?

Who will give us the Spin Drive to the stars? ■

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No doubt you've noticed the "new look" of this month's cover, centering about the new logo. This is part of a redesign project involving all of the Davis fiction magazines; as with everything we do, we welcome your comments on this and the issues to come.

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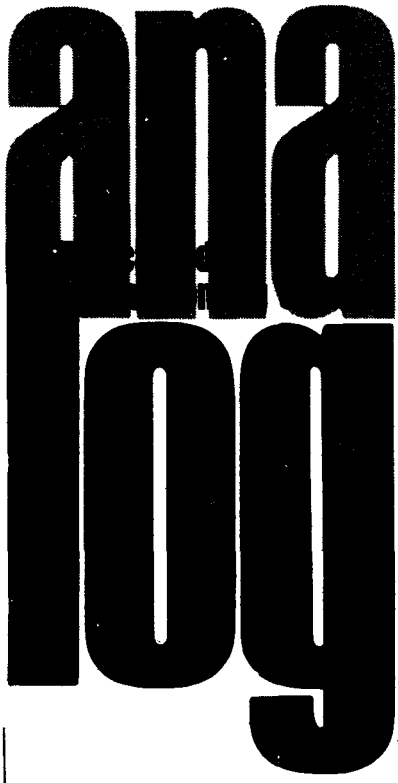

4-7 May
NCC '81 at Chicago, Ill. The National Computer Conference. Info: AFIPS, 1815 N. Lynn St., Suite 800, Arlington VA 22209.

8-10 May
Kubla's Ninth Khanphony (Tennessee-area SF conference) at Holiday Inn, Nashville, Tenn. Guest of Honor—Charles L. Grant, Master of Ceremonies—Andrew J. Offutt, 1981 Frank R. Paul Award Winner—Jack Gaughan, Special Guests—Forrest J. Ackerman and Stephen King. Registration—$8 in advance, $11 at the door. Info (registration/art show): Ken Moore, 647 Devon Dr., Nashville TN 37204. 615-832-8402. Info (hucksters): Larry Wolfe, 410 N. 16th St., Nashville TN 37206. 615-228-8850.

10-13 May
NUCON (Australian regional SF conference) at New Crest Hotel, Sydney, N.S.W. Guest of Honour—Larry Niven. Info: Geoff Langridge, 1 Raper St., Newtown NSW Australia.

22-24 May
V-CON 9 (British Columbia SF conference) at Holiday Inn, Harbourside, Vancouver, B.C. Guest of Honour—Vonda N. McIntyre, Fan Guest of Honour—John Gustafson, Toaster—Jon Singer. Registration—$12 until 15 April 1981, $15 thereafter. Info: V-Con 9, P.O. Box 48701, Bentall Stn., Vancouver, B.C. V7X 1A6 Canada.

29-31 May
AMBERCON 3 (Kansas-area SF conference) at the Holiday Inn Plaza, Wichita, Kan. Guests—Ken Keller (fan), Bill Warren (artist), Walt Liebscher (special), Edward Bryant (toastmaster). Info: AmberCon 3. Box 947, Wichita KS 67201.

2-7 September
DENVENTION II (39th World Science Fiction Convention) at Denver Hilton, Denver, Colorado. Guests of Honor—C. L. Moore and Clifford Simak, Fan Guest of Honor—Rusty Hevelin, Toastmaster—Edward Bryant. This is the SF universe's annual get-together. Professionals and readers from all over the world will be in attendance. Talks, panels, films, fancy dress competition, the works. Join now and get to nominate and vote for the Hugo awards and the John W. Campbell Award for Best New Writer. Info: Denvention II, P.O. Box 11545, Denver CO 80211. 303-433-9774.

—ANTHONY LEWIS

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COLLECTOR'S ITEM

Barry B. Longyear

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Sometimes it's hard to tell whether you're winning—because winning is relative.

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As per the instructions in his will, I was going through my father's things, and it was a pitiful small lot indeed to represent the entire life of a man. Although he had been an English teacher, he hadn't accumulated very many books. He loved books, which is why he rented the dark little room over the candy store. It's right across the street from the library. The few books he did have were piled atop a dusty mirror-mounted dresser. Among them: Coleman's *Relativity For The Layman*, Einstein and Infeld's *The Evolution of Physics*, and one of those Barnes & Noble college-outline things, Bennett's *College Physics*.

They were all paperbacks and all half-read. I smiled, wondering what bee in my father's bonnet had driven him to take on physics—especially physics. My father did not belong in the twentieth century. He would have been more than happy believing the sun orbited the Earth and that things twice as heavy fell twice as fast. He had his English in which to glory. That was all the world he ever needed, or had, or wanted. The books being half-read seemed to indicate that he had either found his answer, or had satisfied himself that if he did find it, he wouldn't understand it.

The walls were hung with a few dark photos and a drawing or two. His closet had two threadbare suits and several equally threadbare shirts and pairs of casual slacks in it. As a devilishly hard rain rattled the two windows in the room, I closed the closet door and went to my father's desk.

Thunder rumbled away, and I turned on the desk's gooseneck lamp. It was still early afternoon, but dark. I sat in the chair and looked at the desk calendar—one of those sheet-per-day things. It read: Wednesday, 2 July 1980. That was the day he had died, across the street in the library. The remainder of the ruled sheet was empty. I absent-mindedly flipped through the remaining sheets until I came to July 30th, 1980, the day his son had finally arrived, upon some lawyer's instructions, to gather up the effects of the late Nathan B. Hall. That sheet, too, was blank.

There was a telephone on the desk, and I lifted the receiver to see if it had been cut off. A dial tone. The man is dead, but credit lives on. I dialed the lawyer's number and waited. "Wayne and Bowman, attorneys at law, may I help you?"

"Yes. This is Jay Hall. I'd like to speak to Mr. Bowman."

"He's out right now. May I take a message, Mr. Hall?"

"Look, I'm supposed to gather up my father's things. You know, because of the will. But there's nothing here to gather up." I fingered a framed coin that stood on the desk. It was a beat-up 1978 Washington quarter. A real collector's item. "The furniture is rented and everything else is junk—and not much of that."

"One moment, Mr. Hall." I heard the eternal movement of papers in the background. "It's just a formality, Mr. Hall. Your father's will was specific in that you examine his effects. Just check to see if there is anything of value. Perhaps something of sentimental value."

I shrugged. "Thanks."

"Would you like me to have Mr. Bowman call you back?"

"No. Thank you." I hung up the re-

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ceiver and sat staring at the quarter in its cheap dime-store frame. The frame had to have cost more than the quarter was worth.

I rubbed my eyes, feeling slightly regretful that my father was a mystery to me. All the old clichés applied: you don't miss them until they're gone; etc. He wasn't a mysterious character. I just never bothered to get to know him. He was a dusty, dull little man teaching a dusty, dull little subject. He was absorbed in teaching sixth-grade English. I couldn't stand the subject in that or any other grade. Geology interested me, and when I tried to interest my father in the subject by explaining how the mountains around our Pennsylvania home had been thrust from the sea and then eroded away, he simply shook his head and said "Jay, I'd rather not hear about it." It bothered him to think that there once was a time when those mountains were under water, and that a time was coming when those mountains would be gone. My father's Earth was a solid, unchanging entity, and that's the way he wanted it to remain.

I had laughed at him. My father was the image of the pioneer driving in a property marker and by so doing declaring "This part of the Universe is mine—forever." And I had tried to explain to him what plate tectonics was doing to his "forever." He didn't want to hear about it.

But as I looked at that quarter at the age of thirty-eight, I understood a little more about my father's uneasiness at geological change. Continuous social alterations washed across the world, Mt. St. Helens continued to pound the hell out of southern Washington State, while the Soviets continued to pound the hell out of Afghanistan. Tens of thousands of Cuban refugees were finally getting sorted out, except that racial unrest now had snipers hunting police 1960s-style in Miami and Chattanooga. The Cambodians, the most current recession, the insanity of political party conventions . . . the Shah had died the day before, but the *Imam* still held America hostage. I was still playing Russian roulette by smoking with my heart attack not yet a year past. Nobody knows anything for certain from one day to the next. I understood that much about my father, now; I could use the security of a little permanence myself.

I looked from the desk to see the three paperbacks on top of the dresser. I had done well in physics. He could have asked me his question—if he had thought that I would have listened—if he thought his son gave half a damn.

I suddenly felt a great urge to know and understand this character—to share something of what he thought, knew, liked, hoped for. But what can you learn from a bunch of wornout clothes, a few half-read books, and a beat-up 1978 Washington quarter in a cheap frame?

I opened the center drawer of the desk and found a clutter of odds and ends. Paperclips, rubber bands, a half-full box of chalk. I smiled at the chalk. He had been retired for nine years; yet he kept the chalk. Pipecleaners. He hadn't smoked since his lung cancer had been diagnosed six years ago; yet he kept the pipecleaners. The drawer still had flakes of tobacco in it. I shut the drawer.

The upper left-hand drawer contained blank envelopes, blank stationery. Some

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of both had been used, which at least meant the old man had been in contact with someone. I opened the lower left-hand drawer. It was crammed with files. I pulled one out and read its identification: Anderson, Mary—1954-1955. I shook my head. Was anybody ever named Mary Anderson? Sounded like Andy Hardy's first date.

Inside the file were childish scribblings on three-ringed wide-lined paper. "What I Did Last Summer" by Mary Anderson, Grade 6, Room 4B, Mr. Hall. And what did Mary do in the summer of 1954?

"What I did last summer was too go too my fathers' cabun in the Catskill Mountan. We hunted and we fished and cooked fish and marshmellows on a wood fire, though I did not care too much for the bugs. Then we went home. It was good too be home again because my friends are their. The woods are allright if you like them. . . . "

I shook my head as I closed the file. "What are you now, Mary? Probably some wigged-out environmental freak." I flipped through the rest of the file. "My Favorite Dream," "How I See The Future," "What I Wish," "My Secret Friend," "Things I Think About." The topics my father had assigned were about as imaginative as the grind I had been put through in the sixth grade. I put the file down on the desk top and picked out another.

I looked at the label. "Well, Randy Deever, year of 1954-55, what do you have to say for yourself?" Not much. Last summer he didn't do much. Got up in the morning, ate, played, ate, played some more, ate, watched TV, then went to bed. I leafed through the file and found a short newspaper clipping. First Lieutenant Randolph Deever, 1st Air Cavalry, U.S.A., reported missing in action near Buon-bu-n'jang, Vietnam.

I went back and leafed through Mary Anderson's file more carefully. There were several clippings from bookjackets and newspapers about a writer named Joy Frank. And Mary Anderson is Joy Frank, novelist.

Another file. Stienmetz, Willy, 1954-1955. In the summer of '54 he buried his mother. In the summer of '69 he was killed in an anti-war protest demonstration. At the time he had his doctorate in romance languages.

I opened the file drawer all of the way. In it there were, perhaps, fifteen files. The records of a few students out of his forty years of teaching from eighty to a hundred students per year. I sat back and thought. My father had touched the lives of between three and four thousand persons. Forty years of classes, yet he had kept the assignments of just a few. I looked through the files and separated out his bank statements, greeting cards, correspondence, his transcripts and diplomas. Remaining were the files on five students. Mary Anderson, Randy Deever, Willy Stienmetz, Tommy-Sue Robertson, and Paul Nolan. All sixth grade, year of 1954-55.

A quick look told me that Tommy-Sue had ditched her "Beach Blanket Bingo" name, became Susan Robertson, and had achieved doctorates in both mathematics and physics. A note scribbled in my father's almost unreadable hand mentioned that Paul Nolan had been accepted at Brown University.

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From Paul Nolan's file I pulled out his single-page theme "My Favorite Dream."

I don't have a favorit dream. I don't really dream much at all. But when I do it is scarie. It is about a man. he is covered in mud and blood and black stuff like he was burned real bad. He talks to me and he is not nice the way he talks to me. He uses bad words, and he shouts at me. Sometimes he cries. Even when I wake up I smell smoke. The dream is very smokey. Then if I go to sleep again the man will be there and he will sit and talk. He talks a lot then he yells like he's real mad and he walks off into the smoke. I don't understand what he says because in my dream I can't here him good. I think that is what makes the man mad.

Tommy-Sue Robertson's "Dream"

It is not a nice dream, like the one I have about my girl friends and the pyjama party or when I dream about my boy friends. Sometimes I start dreaming about those and then this man changes the dream. He is horrible and dirty. His face is all red, and he yells at me and makes me cry. He calls me awful names. Once he called me a silly little b---h. I know I shouldn't write that, Mr. Hall, but that's what he called me. Sometimes, when he isn't yelling, he trys to talk to me but I'm so scared I can't hear him. He gets mad again and walks off in the smoke. The smoke is there for a long time and I can smell it when I wake up.

I thought for a moment. A remarkable coincidence? Or a remarkably inept piece of cheating? Yes, Virginia, there were students that cheated even way back in 1954. Back in 1954, we were the wild, unruly generation while our parents were the sainted ones. I opened Willy's file and took a look at his favorite dream.

I only have one dream and it is not a dream but is a nightmaer. He is a solger that is standing in a lot of smoke. He is hurt real bad and his face looks real mad. He shakes his fists at me. I can see his mouth yelling at me but I can't here him. I can tell he is a solger by his uniforum even though it is dirty and ripped all up. Once he got down on his knees and was talking right to me but I still can't here what he said. I wish I could here him. He wants me to real bad.

I looked at Randy Deever's Dream:

This man he comes to me in my dream. There is smoke all around. He just stands there and looks at me. I ask him who are you and he just shakes his head and walks away in the smoke. That's all. It's the only dream I ever have.

And Mary Anderson's Dream:

My favorite dream is always about the angel who brings me to Oz to see the Wizard, Dorothy, Glenda, the Munchkins, and all the other neat people there. I go to the Emerald City and look through all the streets and stores. But two nights ago I met the Wizard for the first time. Above the gate to the city was the word TURKU. I asked the tin woodsman what it meant and he said it is the name of the city. The Wizard's court room was full of smoke and he towered over me. His face was red and

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angry. The cowardly lion ran away and the scarecrow burned up. The Wizard opened his mouth and yelled at me but I couldn't hear him. I asked the tin woodsman what the Wizard was saying, but the tin woodsman couldn't hear him either. Then everything disappeared except for the smoke and I could see the shadow of a man walking away from me. And there was a burnt wooden sign on the ground. It said TURKU. The next day I looked it up in the library. Turku is a city in a country called Finland.

I thought for a moment, then sorted all of the themes from all of the files and collated them by title in the order in which they were written. "My Favorite Dream" was due Monday, November 1st, 1954. The next date in order was Wednesday the 10th. Due: "How I See The Future." Paul Nolan's Future:

I will be a profeshional football player in the future. There is nothing else I want more. I am on the second string at school now, but Mr. Yates says I will be on the first string next year. There was a man who talked to me after the game last Sunday and he said there is more to the future than football. Not for me.

Tommy-Sue Robertson's Future:

I see the future as a time when everything is good. There will be no poverty or hunger or diseases or wars or crime. That is the future I see. My new friend says that if that's what I want, it will only be because I make it so. He says it just won't happen by itself. He is a very sad person, but nice.

Willy Stienmetz's Future:

The futur will be a horrible place. The man I talked to last Monday says so. He even has pitchurs. It's true. I even saw the dates on the backs of the pitchurs. Everything is burnt and crumbeled. Sick and dead people are all over the place. The hungry people have no food. He said that the futur doesn't need to be like that. I don't see how nobody can change it though. He's even got pitchurs. He wanted me to keep the pitchurs, but I ran away because they made me sick to look at.

Randy Deever's Future:

I don't see any future. But I want one. I want to plan for one. I am very good at art. Mrs. Bule says my drawing and painting are very good. I like it a lot (I like English, too). My friend says painting is important. But there are other important things too. My friend is a soldier. He is a major, and that's what I call him. I don't think I want to be a soldier though.

Mary Anderson's Future:

No one can see the future. I like to think it will be wonderful. I don't want any wars. My father was in Korea in the infantry and he says bad things about wars that I shouldn't write. My Uncle Rich was too young to be in the war, and he always is saying that he wishes he could have been in it. My father tells Uncle Rich that he is a bad word. Mother says that I should never use that word. My new friend calls my Uncle Rich the same bad word. Major says that the future will be what we make it. It can be very good or very bad. I hope it will be good.

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The next theme, due Monday, December 20th, 1954, was titled "What I Wish." I frowned. The titles my father had assigned appeared to be playing off of these five students. When I was in the sixth grade, we all did "The Things I Wish" theme right before Christmas. We all turned in either shopping lists of toys or syrupy "peace on Earth" pieces. These five had done something a little different.

Paul Nolan's Wishes:

I used to think I wished to be nothing more than a profeshional athalete. I'm good at sports and I have fun. But there is more in the world than that. There are things I would like for Xmas, but I don't think about them much. This man I met back during football sees me now and then and he took me to the library here in town. He showed me lots of things that happened to hole civilizashuns and then showed me how those people could have changed things if they knew what was going to happen to them. I think about it a lot. I always hated history. But now I think about it a lot.

Tommy-Sue Robertson's Wishes:

I wish it could always be Christmas. I don't mean presents, although I like giving and getting presents. I mean how nice people are. I like the music being played all the time and how everyone is nice to everybody else. My sad friend says that many people need an excuse—he calls it an official authorization—to be nice. And to be smart. And to be sane. I don't know what he means by that, but I think I feel what he means. I wish I could invite him home for Christmas dinner, but he can't come.

Willy Stienmetz's Wishes:

I wish my mommy was alive. This will be my first Christmas without her. We never had any presentes. I mean real presentes, like you go and buy in a store. But mommy would make things. For my sister mommy would make these little dolls out of apples that were all dryd up. They looked like little old ladys. They had dresses and hair and little shawls. Onct mommy made me a quilt for Christmas and I still have it. I wish mommy was alive for Christmas. My friend says that people die and we should remember the good things and not feel too bad that theyre gone. He says that more people will die in the future. He says that we should make sure that when they die will leave nothing but good things for people to remember. He won't come to Christmas dinner, which is probly just as good since we can't afford an extra place at the table daddy says.

Randy Deever's Wishes:

I want to paint pictures of happy people and happy places. I hope I get the paint set I asked for. Mom said things to Dad about paints being messy, but I know about how to take care of paints. Besides, whats a couple of spots on a rug if you get a beautiful painting for it? The major says that to paint happy people and happy places, there must be happyness. First there has to be happyness, then you can paint it. The major says that there are things that you must do if there is to be happyness. You can't paint it if it isn't there. I don't know about him. He is always pushing at me

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to do something else. But what I want to do is paint. And that's what I wish. I wish I can spend the rest of my life painting pictures.

Mary Anderson's Wishes:

I often think of the fairy tale where the genie grants a person three wishes. If I had three wishes I would first wish for everything in the world to be perfect. Second I would wish for the Major to be happy. He is so sad. I think if I got my first wish, the second one would take care of itself. I'll save the third wish in case something goes wrong with the first two.

Due on January 4th, 1955 was "My Secret Friend." My father appeared to be looking for the enigmatic companion of these five kids. They complied.

Paul Nolan's Secret Friend:

My secret friend is a great man. He knows more than anyone else in the world. Sometimes he helps me with my homework. I talk to him and he talks back, but when Mom or Dad looks in my room to see who I'm talking to, they can't see him. I asked Dad about this once, and he said not to worry about it. He said he had a secret friend when he was a boy that he could see and that no one else could. They would play and have a lot of fun. But my secret friend doesn't play with me. He is always after me to work, learn, and study. He says the future is a ball of clay and that the ones who shape it will either be artists or idiots. He says that there are many kinds of artists. He is tall, blond, and very sad.

Tommy-Sue Robertson's Secret Friend:

No one can see my secret friend. He knows all about numbers and why things work the way they do. He shows me these things, and it's not like math or science in school. He shows me how these numbers and laws affect people and future events. I told my father about my secret friend, and he got very upset and sent me to a doctor. The doctor talked to me, then told my father I would outgrow it. I told my friend about it and he laughed. His name is Major. He said he would be with me forever.

Willy Stienmetz's Secret Friend:

My secret friend is named Major. It's a strange name, and he is kind of strange. I am not comfortable with him. He tells me terrible stories about things to come. I talked to my father about Major. He told me to go and do my homework. Major talks a lot about the right and wrong of things. I think he wants me to do something, but he wants me to figure it out myself. He is tall, blond, and very sad looking. Denise Jordan told me she had a secret friend called Annette. Annette is her age and plays games with her. Major is an old man.

Randy Deever's Secret Friend:

I don't know if I can call Major a friend. He is always there, and he helps me with my homework. But he is not fun like a friend should be. Major keeps pushing me to look at history, politics, wars, and all sorts of things that don't have anything to do with painting. He says that happiness has to be there to be painted. But I can imagine dragons when there aren't any dragons. Why

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should happiness be any different? If I paint pictures of happiness where there is no happiness, is that any different than painting dragons where there are no dragons?

Mary Anderson's Secret Friend:

My secret friend is the Major. He is tall, blond, handsome, and very sad. He shows me how to write. No one can see him but me, and my father says everyone has a secret friend as a child. Still the Major is very real to me. I have touched him, laughed with him, have seen him cry. I want my parents to see the Major, but they never can, even when he is standing next to me. The Major says I should not worry about it. The future is before me and there is enough there to worry about. The present is just an instant. The future is eternity, he says.

Due January 27th, 1955 was "Things I Think About." My father on another fishing expedition.

Paul Nolan:

I think about a lot of things. Things are very nice in 1955, but what will they be like years from now? None of my friends ever thinks about ten or twenty or thirty years from now. Major says that I should think about these things. He said it wouldn't hurt if you did too. I don't mean anything by that, Mr. Hall. The Major said it.

Tommy-Sue Robertson:

I think about the difference between being good and being happy and if there are any differences. And if there are any differences, should there be? Since the Major came into my life, I think about a lot of things I never thought of before. I think I want to be a scientist and learn how to make things work. The Major reads my themes and helps me sometimes mostly with spelling. He can spell very good. That's the way I say it. The Major says I should say that he can spell very well. I don't care myself. He also said I should tell you the title of this theme should be Things About Which I Think instead of Things I Think About.

Willy Stienmetz:

I think about the Major. I don't know much about him, but he knows everything about me. When he helps me with my homework, it looks so important to him, when I don't really think it's all that important. But he makes me learn things. They are awful things. He took me on a trip to see a movie yesterday. It was in a town I never been to before. The movie has a funny name, and the Major isn't here so I can't spell it right, so please don't give me a bad grade for not getting it right. It is Appocolips Now. The movie scared me a lot. I don't understand what the story was, but I think about it a lot.

Just what, I wondered to myself, is being pulled here? The motion picture mentioned hadn't been released until 1980. I shook my head and continued:

Randy Deever:

I think about the secret friend I used to have. I don't see him anymore. Every time he saw me before, he cried. He said I should always remember him and that I should do the things he wanted. He wants me to be a soldier. He says

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I can paint too, but that I have to be a soldier. He said I will know why when it's the right time. He said he will see me again when I am older. This is his picture.

I glanced at the picture, and it was quite a good drawing for a sixth grader. I turned to the things Mary Anderson thinks about.

Mary Anderson:

I think about the things I would like to write. There are so many stories, and there are so many things you can try to do with stories. I think the things Major tells me about are things I would want to put into my stories. He loves his father very much, but never told him that. He talks about being in a terrible war that doesn't have to happen. Major says there are lessons people have to learn to avoid the war. He says stories can help people understand things like that.

I tossed the themes upon the desk and shook my head. Whatever the Major had accomplished, he hadn't avoided the war. I laughed to think about it. I wasn't in a combat unit in Vietnam, but Vietnam had happened. And after decades of fighting off Japanese, French, and Americans, Vietnam took a deep breath during its brief moment of peace, then performed as its first act of foreign policy the invasion of Cambodia. Then China invaded Vietnam, got its nose bent, then hustled out. The Russians were up to their samovars in Afghan rebels, Iran . . .

I looked at the small pile of themes. What in the ever-loving hell did they mean? I leafed through them again. Mary Anderson's dream had the Major talking from a holocaust from some place in Finland. Turku. Well, at least we weren't fighting in Finland.

I reached into my father's file drawer again and pulled out his correspondence file. There was a letter of his, dated February 16th, 1955, to a coin company in Illinois. The company's answer was scribbled on my father's letter.

> . . . When I collected the lunch money from the students, I found this coin among them. Can you tell me anything about it? Yours,
>
> *Mr. Hall, this appears to be an excellent forgery, although I can think of no reason to forge a 1978 Washington quarter. Such date alterations are possible. For example, with a 1950 quarter, the 50 can be silver soldered, carved, and polished into a 78. Such attempts are usually obvious, although I could swear this one is die stamped. However, the many scratches and other circulation marks might obscure the telling signs. It is a curiosity, but not much of a collector's item.*

I looked at the Washington quarter in its frame. I reached for it and pulled the cardboard from the back. I tilted the frame and dropped the quarter into the palm of my hand. A 1978 Washington quarter. I looked through the remaining few letters in my father's file. There was a letter from the FBI wanting to know why my father was trying to get in touch with Susan Robertson. Another from the State Department not admit-

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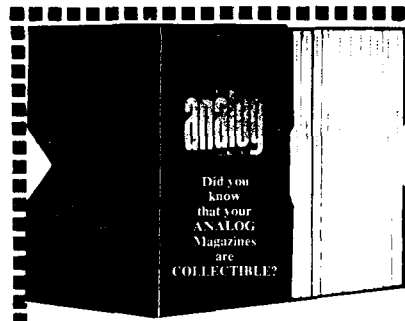
ting that any Paul Nolan worked for them, but also asking why my father wanted to know. A letter from Willy Stienmetz's mother conveying the sad news of Willy's death in a street demonstration. Another letter from the FBI wanting to know what connection, if any, my father had with Willy Stienmetz. A letter from Mary Anderson:

> Dear Mr. Hall,
>
> Thank you very much for the very kind things you said about my new book. I hope it will be as important as you think it is.
>
> Yes, I seem to remember Willy Stienmetz telling me that he had gotten some money from the one we used to call the Major. He was very poor, you know. He told me when we were in high school about the Major. I'm sorry to hear that Willy is dead.
>
> I guess the Major is still with me, in a way. It's as though he is an idea in the back of my head. I still hear the idea, but I can't remember what he looked like. . . .

A letter from Randy Deever:

> Dear Mr. Hall,
>
> Sorry it took me so long to answer, but the mail is all screwed up over here. This nightmare is becoming almost monotonous in its regularity, but it's nothing compared to the one we're avoiding. Yes, the Major is still with me. He is at my side on S&D missions, and he's saved my hide more than once. If I told anyone else about the Major, they'd think I was



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crazy, which might not be a bad thing. At least I'd get sent home. But the Major says we have at least one more mission to do. We'll do it alone, together.

Here is the picture that you asked for. Major Hall hasn't changed much at all—

I sat straight up. *Major Hall!* I looked through the rest of the correspondence file, then through the other papers. There was no picture. I looked around the room and saw the pictures hanging on the walls. I stood, went to the door, and turned on the overhead light. The photos were of my mother, my two sisters, five blowups of yearbook pictures. They had no names, but it wasn't hard to guess who they were. And then there was the drawing. Randy Deever had become quite an artist before heading out on that last mission. I took the picture down from the wall, walked to the dresser, and looked into its dusty mirror. I held the picture next to my face. There was no mistaking the likeness. I saw writing on the bottom of the drawing, and I turned and read it.

Dear Dad, If they can learn from this, it is the price; If they cannot learn from this, it is only the beginning. I love you, Jay.

I can't prove any of it. The papers can all be explained away as forgeries. That Finland hasn't been involved in a devastating war by now, in 1980, is no proof. Neither has South Dakota. The Major carried a 1978 quarter, but people in 1980 carry 1978 quarters, as will the people in 1990, if there are people in 1990. But I think the Major might have accomplished what he set out to do. Something has changed. I don't know its significance, but the 1978 quarter I carry with me is not one of your cupronickle and copper sandwiches. The 1978 quarter I have is silver. ■

● Many of the problems facing us may be soluble, but only if we are willing to embrace brilliant, daring, and complex solutions. Such solutions require brilliant, daring, and complex people. I believe that there are many more of them around—in every nation, ethnic group and degree of affluence—than we realize. The training of such youngsters must not, of course, be restricted to science and technology; indeed, the compassionate application of new technology to human problems requires a deep understanding of human nature and human culture, a general education in the broadest sense.

Carl Sagan

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Jay Kay Klein's

BIOLOG

A full-time writer for just about three years now, Barry B. Longyear won a Nebula last year from the Science Fiction Writers of America for the best novella of 1979, an award whose validity was affirmed when the same story, "Enemy Mine," also received a Hugo at the 1980 world science fiction convention in Boston. His first published story, and the second ever written, had appeared only at the end of 1978, in *Analog's* sister magazine, *Isaac Asimov's Science Fiction Magazine*. A first appearance in *Analog* came with "Savage Planet" in the February, 1980 issue.

The quality and frequency of Barry's writing in these first two years also brought him the John W. Campbell Award for best new writer, presented at the 1980 Worldcon's award ceremonies.

Barry had been running a printing company with his wife in Farmington, Maine, when they decided that there had to be something more interesting. She went to school to become a tax consultant, and has since obtained an H&R Block franchise in Farmington. He determined to become a writer; specifically in science fiction when he assured himself by piling up all the books in the house that by far the largest number were science fiction.

Like many other lovers of science fiction, he set out to write the type of stories he likes to read. He is not oriented toward hard science, where the *machine*, the *creature*, or the *new discovery* is the main character. A Longyear story is about people, human or otherwise, with his main purpose to engage and entertain the reader. Strangely enough, he credits 98 sixth-grade children with helping him become a better writer. He visited a friend's English classes to talk about writing, taking home nearly 500 compositions for criticism. After that, he says, you just have got to recognize what's right and what's wrong with a story.

He was born in Harrisburg, went to Staunton Military Academy in Virginia, Pittsburgh Institute of Art briefly, the Army Missile School in Texas, and Wayne State University in Detroit for two years of social studies. Having been a missile technician in Okinawa and Key West, a microfilm production manager in Detroit, a ghostwriter and underground magazine publisher in Philadelphia, and a printer in Maine, Barry has much the varied background most writers seem to accumulate.

Early on, Barry purchased a dedicated word-processing computer system, and by now has written or is at work on so many novels and shorter pieces that they cannot be briefly listed. Branching out into mystery, mainstream, and historical novels, Barry perhaps has fondest hopes for *The Carpenter*, about a zealot, revolutionary, madman, and victim born two thousand years ago.

Barry Longyear

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Chad Oliver

MEANWHILE, BACK ON THE RESERVATION

When something new comes along, there's a tendency to regard it as a replacement for the old. But an "either-or" choice is not always necessary—or desirable.

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Janet
Aulisio

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One of them was coming down.

Greer Holbrook managed a nearly perfect smile. That smile was a work of art and he practiced it a lot. He needed it in his business.

It was helpful to have a specific target again. It simplified matters.

Greer tried to hate them all. He told himself that he hated them with the special loathing reserved for the indispensable. That made it easier.

He could not exist without them, of course.

In one sense, there were always some of them around. They had to have agents among the peasants. Peasants had votes. Awkward, but there it was. Votes translated into funding.

Greer Holbrook knew all about dreams and how much they cost. He knew about representatives, too.

This was different.

One of the gods, dropping down out of the sky. Exposed. Vulnerable.

Once in a while they had to send a real one down. It was good politics. It was also a calculated risk. It did not happen often, but Greer was not a complete stranger to this situation.

Oh, no.

They knew his name up there.

Greer Holbrook tried out his professional smile again. He wished that he felt better about what he had to do.

This was what he wanted, wasn't it?

He was actually going to catch one of them on the ground.

"Take 'em to Missouri, Matt," he remarked to nobody in particular.

The Comanche had once walked this land. They called themselves The People and believed that they owned the Earth.

(Well, the Comanche never walked if they could ride. But they couldn't ride until they got the horse. That meant waiting for the Spanish. And *that* ultimately had meant the beginning of the end for the Comanche. The moral? Greer Holbrook did not pretend to know. Maybe there wasn't one.)

He knew what to do and how to do it. He was willing to play the game and take his chances. The Comanche would have approved of that.

But what would they have made of him?

Greer was a tall and skinny man. He was physically quite unremarkable if you had never seen him in action.

He walked—yes, walked—through the barren urban sprawl of Austin despite the fact that he could have driven. His car, parked near the shell of what had been Texas Instruments, had better than one hundred kilometers left on the battery. He needed a very long walk with high visibility, which was why he had circled around to this side of Austin and spent the night camped on the Mopac. He had to admit that this was one hell of a strange way to start out on a raid.

His mind raced with visions. He looked at the clear hot sky above him and he saw O'Neills and spiderweb mirrors and microwave beams. He saw much more than that. He could see the runaways, the meticulous planners, the righteous, the killers of dreams.

The Comanche had been a short and stocky people.

Still, they knew something about visions.

They knew plenty about enemies.

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They knew how to hate.

Greer Holbrook had never seen a real Comanche, although some remained in Oklahoma. He felt a definite kinship with The People just the same. They too had been left behind. They too were a part of Earth.

The cracked pavement hurt his feet. He had some pain in his shoulders, the pain that comes from tension and weariness. He was tired of being a symbol. He was tired of the loneliness that surrounded him like a shell.

But the spacer was coming.

He would be ready.

He could feel the crowd gathering around him and he could see the dome of the Capitol now. A gleaming passenger dirigible floated high above Congress Avenue. There was more than helium in that ship. The legislature was in session and the state senators always had the best seats in the house.

The tri-di cameras hummed and buzzed. The robocrews were good; the pictures would be in focus and the sound would be sharp.

Are you watching up there in your booze-flowing tin can? Listening? You'd damned well better be. This is for you.

He dredged up a dash or two of charisma and tried to look like the leader of an invincible horde. He was getting the numbers, as usual. He was convincing to that extent.

By the time he hit Sixth Street, the people were pouring through holes in the concrete walls. They were always eager to walk the last kilometer with him. It was the first twenty that were physically lonesome.

They were the customary crew and in truth they were something a bit less than an invincible horde. They were the hopeless ones, the bored ones, the bitter ones, the ones that stayed because of sheer inertia.

The dead-enders.

Greer had few illusions about them but he could feel for them. Perhaps he even loved them a little.

They carried their ever-present signs:

NO MORE PIE IN THE SKY—WE EAT PIE!

SPEND OUR TAXES ON EARTH—WE AIN'T DIRT!

DOWNERS BE COUNTED!

SEND 'EM FURTHER OUT!

PULL THE PLUGS!

Lord, didn't they ever get tired of them?

Some of the Heroes were there, mingling with the crowd. Greer understood the phenomenon well enough. When the present is sufficiently sad—and when the future seems to be restricted to a remote elite—the idealized past looks pretty good. The frustrations pile up and meaningful actions are blocked. Romanticism becomes very attractive.

What else is there?

There was an Alan Ladd, dressed in the buckskins from *Shane*. (''One gun's enough if you know how to use it, Jody.'') There was a Gary Cooper, hitching up his dude pants. (''I may have been—born in Texas—but it wasn't—yes-ter-day.'') There was a Flynn as Custer, complete with the long yellow hair that was a part of myth if not of history. (''Terry's cut the Seventh loose, Cooky! We're on our own!'') There was a John Wayne, weird-buttoned shirt and all. He wasn't the one from *Red River* telling Matt to take 'em to Missouri. This was one of the count-

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less other incarnations of the Duke. ("Think it over *real* good, Pil-grim.")

Androids, yes. Fantasies, sure. Asinine, probably. But the Heroes were kind of fun.

You could use them, too.

They got the crowd stirred up. A mob had to *surge* in order to attract attention. It had to mean business. It had to look ugly.

Greer Holbrook did his part. He stepped out for real, flashing that practiced smile. He concealed his ambivalence. He yelled with the best of them and he kept one hand curled around the worn butt of his authentic Colt.

He led that mob, trying to get caught up in the roar and the confusion.

Head 'em off at the pass?

No..

But there was going to be one hell of a rendezvous at the wilds of Congress Avenue.

The ship was fat and delta-winged and it dropped like thunder out of the Texas sky. It was a Moon-Earth craft rather than a Colony shuttle and it came in smoking on a horizontal landing pattern.

It hit at the far end of the Congress Avenue flightway, braking across the old Colorado River bridge. It needed a fair amount of area with nothing in it, but that was no problem. The city itself was an anachronism, a government center enmeshed in the tentacles of taxing credits and parceling them out again. Downtown had changed its character. It was, literally, where the ships came down on political missions.

The ship whined to a stop at the reception arena in front of the Capitol. It was quite close to the statue of Willie Nelson. The dirigible, safely out of range, fired off some welcoming flares.

A portion of the University of Texas band had marched over from what they still called the Forty Acres, less than two kilometers away. Resplendent in their orange-and-white uniforms and spotless cowboy hats, they struck up "The Eyes of Texas."

The ship waited: alien, strangely earthbound, almost silent.

The governor appeared, flanked by key senators and a covey of police squadrons.

Greer Holbrook and his shouting citizens poured off the Sixth Street ramp onto Congress Avenue. He was only a couple of blocks distant from the inert spaceship.

"Come on, rabble," he muttered. "Let's get rabid."

There had been plenty of ships before, and many delegations. This one was different. He could *smell* the difference.

This one did not bring the standard politico from the Moon.

This one did not bring the polished performers from the network of close-in space stations.

This one brought a real-for-sure deep spacer, generations removed from Earth, someone who had called the Colonies home, known the slingshot mines of the asteroids, tasted the edge of the universe.

The real thing. A rare thing.

Someone to focus the hate. Someone to absorb the blame. Someone you could *go* after.

There was movement aboard the ship. A lock hissed open and a landing

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tube snaked down.

Greer had to time it just right. Timing was everything in a political maneuver. The mob must be close, but not too close. He did not want to force the police into their riot routine prematurely.

The spacer was the first one out.

She could not walk in the Earth gravity, of course. She was clamped into a mechanical frame that almost allowed her to stand upright.

She was obviously terrified. The reality of Earth was far beyond the madness of her most frightening dreams.

She was trying not to scream.

She was a mess.

Greer felt a shock of disappointment that was a physical jolt. He needed an enemy.

He got a shaking, sweating blob of jelly that could only elicit something between pity and horror. That made it tough.

He had seen sick ones before. He had never seen one this sick.

He thought of Senator Garcia. Dear old Juan, adding up the votes, weighing the pressures, calculating the social currents. A deal was a deal. Greer had to deliver.

He told himself that the woman was not innocent. She had chosen her lifeway, or at any rate her ancestors had. She could have stayed out there in her protective egg. She didn't have to come back. She didn't have to work for her side, trying to take still more from a gutted Earth.

It didn't make him feel any better.

Look at her, look at her—

No. Look in her direction. That was enough.

He heard his own voice: "There she is! That's one of them!"

The crowd hesitated, moved, flowed. It was an uncertain sea, but the anti-spacer chants were nasty. The signs waved and the banners tossed.

Greer broke into a run. He was getting close.

He could see the fear in her bloodshot eyes, sense her anguish and contempt and incomprehension.

He did what he had to do, hating it.

He yanked out his Colt, aimed carefully on the dead run, and fired one shot. The flat crack of the .45 was very loud.

The shot ended it. The game was over. The police squads moved in fast, fan stunners keening. The mob melted away, losers again, always losers.

Greer Holbrook went down hard. His head hit the slick unyielding metal of the landing tube. His last conscious image was of her.

The eyes.

The terrible bloodshot frightened eyes . . .

"She wants to see you," Sandy Sandoval said.

It was something less than an order and something more than a request. Sandoval was an aide to Senator Garcia. Call him a flunky but color him powerful.

Greer didn't feel like seeing anyone. He particularly did not want to see her. Stunners were not lethal, but they were also not fun and games. His head throbbed and he had cramps in his stomach.

"Why?"

Sandy shrugged. "You took a shot

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at her."

"I missed, didn't I? I played it fair and square. She wasn't hurt."

"She doesn't understand."

"So?"

Sandy laughed. He was genuinely amused. He was a comfortable man, a secure man, and many things made him laugh. "The senator would consider it a favor."

He did not insult Greer's intelligence by reminding him of his delicate legal position. With Senator Garcia on his side, Greer simply had to watch his step. Garcia was a good senator. That had little to do with his political views; it meant that he kept his word. Without Garcia, Greer was facing a charge of attempted murder.

"Okay. I'll see her. Wheel her in."

"You'll have to go to her. No offense, Mr. Holbrook. It's just that you're in better shape than she is."

"You bet."

"I assure you—"

"Please don't. I know how *I* feel. I need to see her like I need a hole in the head. What can I possibly say to her?"

"You'll think of something."

"Maybe. Maybe not."

Nevertheless, Greer got to his feet.

He walked.

He looked at her and told himself that he felt nothing.

"My name is Ellyn," she said. "It has a *y* in it. We do not use second names in—where I come from."

Her English was oddly accented to his ears, but he could follow her without difficulty. They didn't all speak English out there, but it was by no means unusual. It was not Earth that had sent colonies into space. In political terms, the Earth did not exist. There was a mosaic of nation-states and some of them had a space capability and some of them did not. That was one of the problems. The United Nations were united in name only, which was nothing new. There were divisions even within nation-states. Texas had been in the space business for a very long time; the technology was centered in Houston but the decisions were made in Austin. Space was not a big deal in New York or Montana, especially with the shift of population toward the Southwest.

"I know your name," he said. "You know mine."

"Oh, yes. Your name has travelled—far."

He tried not to stare. There was no need to make this worse than it was. Ellyn was obviously in pain. She was seated in a chair that had a lung-booster on it. There were strut-clamps attached to her bone structure. Her flesh sagged. Her brown hair seemed lifeless and there was a wheeze in her breathing.

Only her eyes were alive and they hurt.

"That mob," she said. "I had to learn the word. I had never seen a mob before. Did you know that? Those *people*. You led them. You—shot—at me. Are you proud?"

"I'm sure that Senator Garcia has explained—"

"He has explained. Do you think we would send a fool down here? Into this?"

Greer did not reply. He wished his headache would go away. He wished Ellyn would go away.

"It is you I do not understand," she

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said. Her voice was not strong. "All that hate. It is beyond my experience."

"Your life has not been my life." Jesus! He was starting to talk like one of them.

"I have studied your profile. You are a gifted man. You are educated. You have technical skills. You did not have to stay *here*."

"Okay. I'm here by choice. So what?"

"So I do not understand." She shut her eyes, tightly. When she opened them again there were tiny flecks of blood on her eyelids. "I am asking you for help."

Greer was angry: angry at her, angry at himself, angry at the situation. He didn't owe her anything. Did he?

"You don't have to understand. It doesn't make any difference."

"It does to me." Ellyn's lips twitched in what might have been a smile. "Please. I *have* to know."

Charming? Greer wasn't charmed. He tried to swallow his anger. It was a bit like trying to eat his own esophagus. He thought of Senator Garcia without love.

"Look, Ellyn. Maybe some other time or some other place. We could kick it all around and gnaw on the bones. Not here. Not now."

"I will say please again. I am not accustomed to the word. I did not have to say it often—out there."

Greer could not resist a touch of sarcasm. "It must be rough for you down here with the savages."

"It is," she said.

The truth of her statement got to him. Dammit, she was a human being. She was hurting.

"I'm sorry. There. I don't say that very often either. We'll talk some. Fair enough?"

"It is a beginning, Greer."

How strange his name sounded in her voice.

Trapped, he sat down.

There was an intensity about her that went beyond pain. Her interest in him had a desperate quality to it. It was not physical, certainly. It was not the kind of curiosity that has its roots in problem-solving. It was really not intellectual at all.

Then what?

Greer had no idea. He knew that he felt rotten. He knew that he had not asked her to be where she was or what she was.

Still, he found that he cared. It was annoying.

"I'll give it to you straight," he said.

"You have my appreciation." Irony? Maybe.

"Ellyn, it's not personal. I never heard of you before you got off that ship. I accept that as part of my own ignorance. I know that you must be someone special, good at what you do. They would never have sent you otherwise."

"Perhaps," she said.

"It took courage for you to come down here. I know this is the hellhole of the universe to you. But sometimes they have to send someone down. A surrogate won't do. They need the votes, they need the credits, they need the lifeline. You got stuck with it. You came. You'll do the job. It's all politics. Why can't we just leave it at that?"

"That isn't enough. I have to understand—you."

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Greer got up and paced. That too bothered him. *She* could not move without great effort. It put him at a disadvantage. It made him smaller than he was.

"You *don't* have to understand me. What are you going to do—give a seminar report? You're miserable right now, out of your element biologically and culturally. Again, I'm sorry. But you're tough. You'll survive. You can go back to your nice organized cocoon and that will be the end of it for you. I'm not part of your life. You'll get what you came after."

"Don't treat me like a child, Greer." Her voice was weaker, almost a whisper. "Why would I ask you to tell me what I already know? You are not answering my question."

"Which is?"

"Give me a moment. I am—searching—for the idiom." She paused. The silence was long enough to be awkward. "Greer, what do *you* get out of the deal? Why do you do what you do?"

That nearly stopped him. Surely there was no need to explain the obvious. Had he misjudged her intelligence?

He said the words. "The spacer comes down. That's you. Magnificent public suffering for the handout—dramatize the common bond and all that. I mobilize the troops. We stage a demonstration. We give Garcia some live ammunition—votes on the hoof. Nobody gets hurt; that would tip the balance. Both sides win. We show the legislature that we have some power. We get our share of the funds. That's what I get out of the deal: a piece of the pie. Pardon me. A piece of the action."

"I know pie," Ellyn said. She shut her eyes in despair. There was more blood when she opened them. "I know pie."

There didn't seem much to say to that, and so Greer remained silent. *His* pause was awkward. He felt her disappointment. No, it wasn't disappointment.

Anguish.

God, what did she want of him? Soul confessions?

She slumped in her great chair. That damnable, earthbound chair! Greer was afraid that she might have passed out.

He started to move toward her.

Sandy Sandoval materialized from somewhere. He must have been listening. Of course.

"Better leave her now," Sandy said.

Greer hesitated, then turned to go. He didn't want to stay, did he?

She forced open those bloodstained eyes just as he reached the door.

"I can't go back," Ellyn said very quietly. "Don't you understand? *I can't go back.*"

He did not see her again for some days, even though they were both housed in the same state building complex just east of the Capitol dome. He had legal problems that he could not ignore. She was busy with doctors and platoons of public relations types.

He talked to her once on the intercom system. It was a brief conversation and profoundly unsatisfactory.

He watched her several times on the tri-di.

She was good on camera, making her pitch. She was so good he could hardly believe it, knowing what he knew.

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It was not uncommon for the deep space people to develop conditions that made a readjustment to Earth difficult or even impossible. Given a few generations out there, the barriers were formidable. The psychological effects of moving from a totally planned, predictable universe to the chaos of Earth were devastating. Freedom—or relative freedom—is tough to handle if you have never experienced it. The physical problems could be worse. When an animal adapts to one environment, it is by definition not adapted to a different ecological situation.

That includes the human animal.

You can calibrate the spin to simulate gravity on the "floor" of a cylinder, you can regulate the atmosphere, you can compensate for the calcium to some degree, you can twiddle with the computer programs.

You can't turn a Colony into Earth.

All that was elementary. It was like knowing that energy came from the sun or how to design an android.

The joker in the ecological deck was that some animals failed to adapt. In the case of human beings, this was not altogether surprising. Primates have a built-in flexibility, but they also have a heritage of millions of years of terrestrial evolution. They can't just shrug it off at will.

Sometimes they cannot change quickly enough. Sometimes they change in the wrong direction.

Even on Earth there were more extinct species than living ones. And Earth has certain undeniable advantages if you once called it home.

In the abstract, Ellyn's problem was simple. She had adapted culturally and psychologically to her Colony. It was the only lifeway she knew, or wanted to know.

She hadn't made it biologically. For purely physical reasons, she could not remain in the Colony and live.

Therefore:

She was expendable to her own people. She would make an excellent one-way missionary.

She could never go back into space.

She had a slim chance on Earth. She hated it. In her body and in her mind she was an alien.

There was one other small item.

His name was Greer Holbrook and Ellyn had turned his world upside down.

As he saw himself, Greer was a strange mixture of a man. Maybe half rational, half dreamer, and half plagued by convictions. That was at least one half too many and it made his life complicated.

He was not in love with Ellyn. There was no physical attraction between them. He was not blinded by pity.

He was stuck.

Ellyn's people. He knew them, the glorious starbound ones: proud, smug, superior, contemptuous, sure.

Runaways.

It wasn't that they had left billions of human beings behind to rot. That was just one of those things, a little question of logistics. It was that they didn't *care*.

They remembered, yes. They remembered on politically expedient occasions. And they mocked. They were very good at that, and perhaps very human. The jokes and stories found their

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way back. Lightspeed was no barrier to the words that hurt.

Did you hear the one about the downer who . . .

Once there was this downer who wondered what the stars were made of . . .

Then there was this stowaway downer who found herself in the cargo hold of a spaceship, see . . .

Greer's own father and his older sister had dreamed the dream. They were not immune. But they hadn't been smart enough, clever enough, lucky enough.

Downers. Losers. Trash all their lives.

So many others, known and unknown. Even a crowded planet has plenty of room for broken dreams.

Greer himself was not immune. He was not anti-space. That would have been stupid, and he was not a stupid man. Greer was pro-Earth. They needed each other.

He could hear the song of the stars.

Oh, Ellyn, I know you.

And here you are. Not by choice. Here just the same. If I turn away, am I any better than what your people became?

Damn you, Ellyn!

Ellyn, *you* have become *us*.

Welcome to the third planet.

"I want you to come with me," he said to her.

She looked up from the prison of her chair. "That's impossible."

"I've checked with your doctors. I've rigged the car. You can move. You need to get out of here."

Ellyn was shocked. "I can't—just go."

"Yes you can. Just go. Just like that."

He watched her trying to grapple with his amazing suggestion. In all her life Ellyn had never done anything spontaneous. Her world had been planned to the last decimal point. In a Colony, you always knew the precise outcome of any action. If you didn't, you stayed put. She had learned in childhood that to act on impulse was blasphemy.

"You won't destroy the Earth," he said. "You won't endanger yourself. You asked me some questions. I want to show you the answer."

She was breathing so rapidly that the booster lung had to reset itself. "Show me, then. Put it on the screen. Bring it here."

"Not good enough. Believe me, it won't work that way."

"I'm—scared. I'm sick."

"I'll take care of you. You *have* to trust me, Ellyn."

"For God's sake, why?"

"You sent for me first, remember? You wanted me to explain some things. I misunderstood you, right? I talked to you about politics and tactics. I had you figured wrong. It was cruel and I'm sorry. You were asking me a different question. How can a reasonably intelligent person live on Earth? What keeps me going? Why have I fought your people? What am I trying to do?"

"Those were the questions," she said weakly.

"Your world is closed to you. Everything you believe in has been taken away. Your future is here, the last place you want to be. Is there anything in it? Anything worth having?"

The droplets of blood smeared at her

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eyes. She did not attempt to answer him.

Greer smiled. It was not his professional smile. "You see. I do understand, a little. We may be slow down here, but we do catch on eventually. I can show you. All we have to do is get that butt of yours out of the chair."

Ellyn shook her head. The flesh pulled at her skull. "Greer, I *can't*."

He hit her with it. There was nothing else to do. "No guts, Ellyn? I don't believe it. You lost everything that mattered to you. You rode that ship down here, which wasn't pleasant. You were attacked, shattered, torn apart psychologically. You didn't quit. You did your job and did it well. You made their case. You even sent for me, the ogre. That wasn't easy. Guts? You've got your share. If you won't try now there's just one reason. You're dead, inside and out. You're not worth saving. Are you dead, Ellyn? We can't even recycle you here. You're useless."

There were tears mixed with the blood. The words had hammered her into the chair. The final word had been too much. Greer had used it deliberately. He knew something about conditioning.

"Not—useless." She was shaking.

"Get mad, Ellyn. Fight. You're not dead. You're not useless."

She looked away from him. "I don't know. I don't know."

"I do. I need you." He reached out and touched her. "Wipe that damned blood out of your eyes. Get ready."

She did.

It was not a long drive south along the old San Antonio highway, well within the range of his battery. There was virtually no traffic, of course. Greer knew the route by heart, including all the broken stretches and detour markers attached to corroded Interstate 35 signs, and in truth there was not a great deal to see.

For him, it was strictly ho-hum.

For Ellyn, it was white-knuckle time. She would not have noticed if a dinosaur had wandered onto the road at San Marcos. She was so frightened that she forgot to worry about the effectiveness of the car's special life-support equipment.

The trip was totally outside her experience.

Greer turned off on the dirt road that led to Canyon Dam. It was rough and the car bounced.

"My place," he said with a touch of pride. "The project. You're in it now."

She tried to look. Some of her fear yielded to a sense of bewilderment.

There was a hot sun in a cloudless blue sky. There was no wind but the air was not as heavy as in humid Austin. The grass, what there was of it, was scorched and summer-brown. Ancient wire fences had collapsed around the sagging walls of deserted wooden farm houses. The cedars had a rich piney smell to them. Some of the mesquites were coming back and their green-feather leaves broke the desolation a little.

Nothing moved in the heat.

"It's empty," she said.

"Looks that way," he said cheerfully. "Wait."

She didn't have much choice. The car jolted along and there was a faint smell of water in the air.

Soon—within six kilometers of the

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highway turnoff—they began to see things.

There were weathered rock walls in good repair. There were stock tanks and cattle swishing flies with their tails. Incredibly, there was a brightly painted store by the side of the road. It had a sign that read: BOB'S GENERAL MERCHANDISE.

There was a great shining translucent dome that swelled like a blister out of the ground. It was big enough to hold twenty space stations. It hummed with power.

"We make things there," Greer said.

There were dwellings. Some stood alone and others formed clusters. Conical tipis. Squat yurts. Huts with walls of wattle-and-daub and roofs of tawny thatch. Towers of multi-colored glass. Adobe apartment houses. Rectangles and cubes and blocks of cool metal that turned back the rays of the sun . . .

The car climbed through an old cut; the strata in the rocks were clearly visible, stacked there by millions of years of geological time. The road dropped down along a gentle slope. The land was greener now and there was a welcome stirring of breeze. They saw a man on horseback. He looked like a cowboy was supposed to look and he had a rifle in his saddle scabbard. He took off his crushed and sweaty hat and waved.

"Calls himself Slim," Greer said. "Not an android. You might say he's our police force."

Ellyn held on tightly. She was smothered in sense impressions. She could not sort them out.

People. Crazy people. People dressed in shorts or togas or deerskins or nothing at all. In the shade, in the sun. Children. She had never seen so many children. Playing *games*. It was obscene.

Greer stopped the car for a moment on a bridge. It was terrible. There was water under it. Fast green water. She could hear it.

"The Guadalupe River," Greer said happily. "See the limestone on the bottom? See the cypress trees? Look at those twisted roots! They've been here forever."

There were people fishing in the river. Some of them were standing right out *in* it. The rushing water curled around their legs.

Ellyn shut her eyes. The bleeding was starting up again.

Greer got the car moving again. Ellyn did not open her eyes. She didn't want to see anymore. He noticed that the graphite assembly on the ridge was coming along nicely but decided that she was in no condition to take it in.

"Greer," she whispered.

"Well?"

"It's awful. I hate it all."

"Thank you," he said. He was hurt in spite of himself.

"I can't help it."

"Takes some getting used to," he admitted and kept on driving.

"Super grok," he said.

Ellyn was somewhat calmer now, seated at a wooden table in Greer's home. Her portable lung booster was working well and she was surprised to find that she was hungry. She could not face the thought of meat but the bread was fresh, moist, and delicious. She drank water instead of milk. It tasted as though it had *things* in it.

"That's what you expected, wasn't

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it?'' he asked. ''A kind of hive mind. Downers groping in the grass. The works.''

Ellyn searched for words. She stared at the paintings on the walls: a dark little fish with whiskers finning in a green current, a whirling abstraction that was an explosion of colors, a frosted star cluster that she recognized on black velvet. Had he done them?

It was a lived-in house, rustic and incredibly roomy by her standards. So much space and yet somehow not threatening. Bright throw-rugs on the hardwood floors. A soft couch that extended the length of one wall. Shelves of books that looked real. Some of them must be very old. Lights from individual bulbs. Not harsh. No . . .

She knew that she had hurt the man who had built this house. He had shown her—whatever it was. He had been proud of it. She hadn't laughed. She had recoiled.

''I don't know,'' she said. She still could not find the right words. Perhaps they did not exist, between the two of them. ''I don't think I expected anything—specific. Greer, I am not trying to be insulting. God, I *want* to find something. I must. I just cannot grasp it. Don't you see? Your—project, whatever it is called. This plan—''

''There is no plan,'' he said with a touch of weariness. ''It has no name.''

''That's impossible.''

''You're sitting in the big fat middle of it, aren't you?''

''Well. You have a point. But, Greer, you're the leader—''

''No. I just fix it so things can happen.''

''There *has* to be a plan.'' There was an edge of stubbornness in her voice.

''Why? Because that's the way you have lived? That's the way you did it on your island?''

''I am not ignorant, Greer. I have studied social systems.''

''Oh, wow. Cheers. Applause.''

''That's not fair. *You* know that there must be structure. Without it, a group cannot do anything. It cannot go anywhere.''

''It's not a group. It's many groups. We don't have to go anywhere. We're here.''

''That's—semantics.''

''Maybe. Do you know what my idea of hell is?''

''Trying to communicate with me.'' She was relaxed enough to attempt a joke. That was progress of a sort.

''Hell is a place where everyone is the same. Hell is a place where there can be no surprises. Hell is a place where there is just one idea. Sound familiar?''

''You can't possibly know what it is like out there.''

''I've seen a few hells. I think you lived your life in one.''

''That's crazy. Better hell with a purpose than anarchy. I can't stay here, Greer.''

''You don't have to stay. Nobody has to stay. We've kicked a few people out. We've never forced anyone in.''

She was tiring visibly. It had been a long, strange day for her. ''I don't want to argue with you. I hate the way I sound. It's just—I'm so disappointed. Can you understand that?''

''Yes.'' Greer started to reach for his pipe but rejected the idea. One more shock might do her in. *I need some un-*

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derstanding too, he thought. *I'm human. I have doubts. It's no good just preaching to the converted. I need to reach this woman. For both of us.*

"Can *you* understand this, Ellyn? It's about freedom. It's about diversity. It's about survival."

"This? Survival?"

He tried. "Think of all the Earth as a Colony. It is, you know. *We are in space too*. We orbit the sun. There are more people here than in all the rest of the solar system put together. This is where it has to happen. We've got an enormous opportunity here—an entire planet made to order for us. We've licked the energy problem, thanks to you. We've moved out the factory complexes, most of them. We can afford to experiment. We can try new things. If we can't do it here, we can't do it. Period. Not in a plastic can. Not in a bottle. Not in a hollow asteroid. Not in a hole in the Moon. Not in a starship. Nowhere."

She looked at him as though he had just told her that air could not be recycled.

"The future is—out there," she said vehemently. "Everybody knows that. By leaving Earth we *ensure* our survival as a species. If we stay here we are putting all of our eggs in the same basket. You see how well I speak the language? There is a universe waiting for us. A new frontier. Earth is where we began. That's all it is."

"Ah, yes. The abandoned cradle. The forgotten incubator. You've memorized your lessons well."

"They are *true*."

"Almost, Ellyn. Almost. They are half-truths. Is that good enough for you?"

"Show me the flaw. I challenge you."

"It's simple. You just have to learn to take the blindfold off and see. *They are all the same*. All the Colonies, all the bases, all the space stations. The same technology, the same organization, the same values. Yes, the same engineers!"

"That's what we need."

"That's *part* of what we need. You spoke of a universe out there waiting for us. Let me tell you something about the universe. You've only touched the edge of it. It's vast, Ellyn, huge beyond our comprehension. We don't know and can't know what we will find out there—or what will find us. We can't say what we will need when the chips are down. What kinds of thinking, what sorts of skills? What colors should our dreams be? What people will have the answers when the questions get tough?"

"Your people, Greer?" There was more weariness than sarcasm in her voice.

"Maybe. Maybe not. But try it this way, Ellyn. You are proud of your command of the local dialect. Fine. You correctly pointed out the danger of putting all of our eggs in the same basket. Push that one a little harder. Think, dammit! What if you put the same egg in a bunch of baskets? What if it turns out to be the wrong egg? What if you need a new egg? Where are you going to get that different egg?"

She was too exhausted to argue further and night had fallen.

Greer carried her outside and they sat quietly on two canvas-backed chairs

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beneath the branches of a gnarled old oak tree. The lung booster hissed softly. A cool evening breeze whispered through the oak leaves. It was an ancient tree and an ancient rite. The wind had been talking to that tree for centuries now.

Somewhere along the river a small band was playing. It was not close, but Greer could pick out the bite of the cornet, the slur of the trombone, the liquid dartings of the clarinet. There was a beat that did not need to be amplified. The band was romping through what Louis had called some of the good old good ones: "Struttin' With Some Barbecue," "Ole Miss," "Beale Street Blues."

Well, jazz had been born along the banks of a river.

It was not out of place here.

Greer knew that Ellyn was stimulated in spite of the strain she felt. There was a crazy kind of hope in him that he recognized as irrational.

If there could be just one chance in a million— He did not try to push her. This was not the time.

He gestured toward the blaze of the stars.

"They are just as close to us here as where you have been," he said. "Not poetry. Physics."

Gently, then, he carried her back into the house.

She was gone.

When she had asked, Senator Garcia had sent a whirly for her. She had returned to Austin. Back to a safe series of antiseptic chambers. Back to a controlled universe. At least she had been spared the dubious pleasures of a second ride in Greer's car.

He had not really expected her to stay. Returning to Earth had been traumatic enough for her. Coming *here* was more than she could handle.

He was not surprised at his sense of loss. That did not make it easier to bear.

Ellyn, yes. But it was more than that. It was what Ellyn represented. There could not forever be two human races, one bound to the Earth and the other riding mechanical toys through the deeps of space.

That was not the way to go.

Greer did the things he had to do, the things he had always done. He mended the political fences, he ironed out the disputes, he kept the lines open to Austin and beyond. He encouraged the personalities that buzzed around him. He planted the cultural seeds that sometimes flowered and sometimes died.

It took all kinds.

Some of the zest had vanished from his life, and some of the certainty. He had come very close to that other dream.

Ellyn, yes. He missed those hurt, skeptical, red-flecked eyes. He missed the challenge of her. It was possible that the hatred that had sustained him had come a shade too easily. It was possible that his kinship with those who had gone went deeper than he knew.

Ellyn could be useful here. That was important to her.

"Hell," he said.

He understood the problem. It was an old friend. There was an emptiness in his busy world.

A type of sameness, even.

They needed each other. He hoped that one day Ellyn might see that.

One day, she might be ready.

There was so much to do.

It was hard to be alone. ■

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L. E. Modesitt, Jr.

RULE OF LAW

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Law, in theory, makes
human relations simpler.
Practice is another matter—and not
likely to be unaffected
by technological change.

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The all-news vidfax came on with a chime, jolting Darrow Bryan from sleep into semi-consciousness.

". . . has ignored the growth of organized white-collar crime. Heathcoate charged that the takeover of Boston firms by 'gray' money has reached epidemic proportions . . ."

Darrow staggered into the shower.

When he emerged, the vidfax was still at it, displaying a split-screen picture, a distinguished-looking businessman in a tailored gray suit on the right and, on the left, a pan down over an audience cheering a jai alai match.

". . . Ingeonelli, grandson of reputed boss Silveo Ingeonelli, declared Graystone's expansion and acquisition of Hy-Ly would allow Graystone to improve its efforts . . ."

"So what?" muttered the still-sleepy attorney as he wave-dried his hair into place. "If it isn't the Oilers, isn't the gray money, it's someone else. Ingeonelli, shmingonelli."

The image shifted to the view of a tanker, centering on the name, *Slyck Queen*, painted on the bow in international orange.

The faxcast was explicit.

"Today federal officials charged James Clancy Eastwood IV with oil profiteering and violation of oil import laws. Eastwood is the son of Multi-Media President James C. Eastwood, III. Neither Eastwood could be reached for comment."

Darrow flicked off the all-news vidfax. He checked the efficiency's insuladrapes for tightness before putting his thermal overcoat on over his thermal vest.

The MTA ride that usually lasted an hour took two. The MTA had cut back the number of trains again.

A single sheet of stationery waited in the middle of his desk. Without even reading it, Darrow flinched. It had to be from one of the senior partners.

A termination? A rebuke? It couldn't be positive. Congratulations were delivered personally.

The memo was explicit:

"After long and thoughtful consideration, both Henry and I feel that you should handle the Eastwood case (file access E-33451(b)). We will be pleased to offer any and all assistance, as well as help develop any line of defense you consider appropriate.

"I need not emphasize that the case should be prepared in keeping with the highest standards."

The memo was signed by Jonathon Fairley, senior active partner of Flush, Fairley, and Forefront.

A damned scuttle job, and I'm supposed to pull the plug gracefully. "Highest standards" means no "guilty" or "nolo" pleas and a pile of appropriate documentation.

Do you hand in your resignation, or quietly do your best, which the powers that be have pre-judged to be inadequate? Or do you struggle against the obviously loaded dice the senior partner has handed you?

After considering the Boston winter and the number of bright young lawyers scrounging for jobs, Darrow dismissed the ceremonial resignation. He looked briefly at his overflowing in-box and turned instead to the controls of his legal console.

As the firm's case file on Eastwood appeared on the fax screen, he turned

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the speed control up to max. He needed the outline first. After the first run-through, Darrow plodded through the tape again, more carefully, taking notes. The background was there, all right, and the whole thing smelled worse than the harbor.

He leaned forward in the small recliner—standard for associates of Flush, Fairley, and Forefront—and stared at the fax screen.

Where should he start?

Darrow pushed his already thinning hair back off his forehead, scratched his left sideburn, and cleared his throat.

"Citations on government regulation of energy imports?"

After a minute of silence, the console replied, "There are 12,233 possible citations. Do you want the full listing?"

Darrow wiped his forehead. He didn't even know what he wanted.

"Negative. Interrogative Constitutional precedents?"

"Article I, Section 8, U.S. Constitution. '. . . all Duties, Imposts, and Excises shall be uniform throughout the United States' . . ."

"Hold," muttered Darrow at the console.

The case was a courtesy. If it weren't, he wouldn't have it. One of the full partners would. Just as obviously, he wasn't supposed to win it. Darcy should have had it, or even Fettinger.

James Clancy Eastwood, III, the president of MultiMedia and the 'Master of Mood,' wanted his son, James Clancy Eastwood IV, defended. Young Jimmy had been cited and indicted by the Department of Energy, Enforcement Branch, and the U.S. Attorney for allegedly owning, through various subsidiaries and aliases, the controlling interest in Slyck Oil. Slyck Oil supplied fuel oil for upper New England.

Darrow shook his head. Why would any right-blooded, energy-saving young American want to profiteer on foreign oil?

He sat staring at the console. The Constitution, for God's sake. Nobody tried to win a case on law, did they? No one ever seriously cited the Constitution against the government.

Darrow tried to fit the pieces together, looking for any angle.

The Oil Anti-Monopoly Act of 1983 forbade U.S. citizens from holding the controlling interest in foreign shipping or foreign oil production, distribution, or refining ventures. In that strange court decision, *Offshore Oil vs. U.S.*, the Third Circuit Court of Appeals had held that while the law could not be applied to U.S.-based companies with both foreign and domestic oil production nor to foreign nationals or foreign companies controlled by non-U.S. citizens, the law applied to everyone else.

In reaction, Congress passed, and President Welsher signed, both a 20 percent additional tariff on imported oil and the Oil Import Act of 1986, which stated that U.S. companies had to import oil and other fossil fuels solely in U.S. built and registered ships.

In plain old American, reflected Darrow, Eastwood was charged with controlling a foreign oil company, using foreign tankers, and failure to pay the 20 percent oil duty levied on all U.S. importers; and in general engaging in the despicable practice of fuel-legging home-heating oil to frigid New Englanders.

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The console buzzed. Darrow sat up straight as Jonathon Fairley beamed out from the small screen.

"Darrow, I trust you've had a chance to review the Eastwood case?"

"Yes, sir. Looks like quite a challenge."

Fairley ignored the pleasantry. "As you may know, the senior Eastwood has been a valued friend and client for many years, and he requested we handle the case for his son."

Despite rumored years of heavy coke use, Jonathon Fairley retained the ruddy good looks and easy manner that had made him a favorite with the Welsher Administration.

"Doesn't the younger Eastwood have his own attorneys?"

"Under the search and seizure powers of the Enforcement Branch of the Department of Energy, young Eastwood no longer has control over any of his assets. He formerly was represented by Hutspaw, Lord, and Masters."

"I see," said Darrow. He didn't, but hoped he would.

"Under the circumstances, and particularly with your background, Hank and I thought you were the best choice. We, of course, would be too close to Jim. Is that satisfactory?"

"Just fine, sir."

"Good. Jim may be in to see you today, and Darcy's handling the release on recognition, although I understand young Eastwood's had some medical problems since he's been in custody. Keep me posted."

Darrow's thoughts were racing as the senior partner broke the connection. The memo had been written either early today or yesterday, but the faxcast had mentioned the charges early in the morning. And Fairley knew that Eastwood had medical problems in custody and had sent Darcy off to get his release.

Medical problems while in Enforcement Branch custody . . . Darrow didn't like the sound of that or Fairley's knowledge of those problems. Did the senior partner know too much? Darrow pushed the thought to the back of his mind. The case itself was bad enough.

He decided to clear out the bulging in-box in order to concentrate on the Eastwood mess. He'd gotten almost to the bottom when the console buzzed again.

"A Mr. Eastwood to see you, Mr. Bryan."

He got up and opened the door to his oversized closet.

A tall, white-haired man barged down the hallway at him.

"Darrow Bryan, huh?" he rumbled. "Your folks must have loved or hated lawyers. You know why I'm here, but then again, you don't know enough. Not a bit of sense in beating around the bush."

Eastwood stood a full two meters, a full head taller than Darrow. The big man half-gestured, half-pushed Darrow back into his own office and shut the door so hard that the thin flexiplast office walls shuddered.

"Sit down. Sit down, Darrow. Mind if I call you Darrow? Look, my son's got this idea that he can solve New England's fuel shortage all by himself . . . just like that. The hell with government. The hell with fairness. The hell with the law. He's going to save New England and make filthy profits doing it."

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Darrow struggled to keep his expression blank. This wasn't how he'd imagined the president of MultiMedia, even though the man matched his holos to a microdot.

"Well, man in my position's got to keep up the images. You know what I mean. So of course the best firm in Boston, my own firm, has to be the one to defend him. But it can't be my attorneys. That's as far as I go. You know what I mean. You're it, Darrow.

"I wish you luck, son, because the government's gunning for Jimmy, and, frankly, I hope they get him. Him and his let-the-government-go-to-hell attitude. He's guilty, guilty as hell."

The man's got nerve, telling me that he picked the third string of the big name firm to insure his own son's conviction. Christ!

"Nothing against you, Darrow. If you want out, I can see your position. Of course," and he grinned at the young lawyer, "you pull this out, and you're made."

"I appreciate your thoughtfulness in setting the parameters of the case, Mr. Eastwood," Darrow said as smoothly as he could. "As you mentioned, it presents quite a challenge. I feel confident, however, that I can do a more than adequate job."

The older man's eyes narrowed.

"Think I should look elsewhere?"

"No, not unless your son decides that. I'll be conferring with him once he's released."

"You've got the picture, Darrow. Wish you luck."

Darrow sat and watched the media executive bull his way out.

Three days later, Darcy had cut enough red tape to get young James Clancy Eastwood IV out of the clutches of the Enforcement Branch and into Darrow's office.

"Look, Bryan, I can see it now. I was a patsy, a set-up. Here I am, believing that it's really a question of poor New England families without fuel, heating oil, what have you. Bull . . . it's a question of power. My old man's friends in Washington want to keep their power, and he wants to keep their friendship.

"Anyhow, I kept it legal, always less than 45 percent of the stock, always let Hassan have the bigger chunk. Then comes the squeeze play. Hassan wants out. Hutspaw sets it up so the Abdullah family trust has 46 percent of the stock, but the old man buys a measly two percent interest and sets it into a trust for me. That gets leaked to the DOE thugs.

"That wasn't enough. The Oilers push through another 20 percent hike. If I don't go along, I don't get oil. So I have to agree. It's not the money. I'm making plenty. If I don't supply the oil, with the DOE allocations so low, people are going to get cold.

"Next thing I know, the Feds are at the front door, and my son's watching me being dragged off. Me, his upstanding dad, being hauled off like some right-wing, screw-the-people nut. Me, the guy who's risking everything to bring heating oil to New England. I know, and you know, that my old man set me up and called his buddies down at DOE and put them on my case.

"You know what burns me worse than that? If my name were Kaliph or Abdul-de-bull-bull-de-bar, not a thing would be wrong. I could laugh my head

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off at them. The Oilers can charge anything, use any ship—and it's fine. Our federal government says, 'Please charge us some more. Our people use too much for their own good.' "

Darrow barely stopped his groan. Still, it could be an interesting case.

"Then," Eastwood plunged on, "the DOE buckos come in and freeze all my stash. Hell . . . they wired my number right into the system. I can't even get a dollar for a piece of bubble gum. So here I am at thirty-five: busted, and depending on whatever my old man's going to give me, or on some liberal public defender, or maybe on some right wing alternative crusader who wants to uphold the non-existent free enterprise system. That kind of defense will send me straight to the federal work farm.

"My wife's left. My kids are fawning over the great man, and the government's drooling over me. And the ever-loving idiots in Congress would like to string me up for treason. If I were a greasy Oiler, they'd be asking for my oil at two hundred a barrel."

Darrow shook his head. Young Eastwood didn't even notice.

When Eastwood had finally rambled out his story, Darrow steered him to the Medico-Legal clinic. Once Eastwood had left, Darrow called the clinic to alert them and to make his own requests.

"That's right, a complete physio-psychic and drug residue series, plus an EEG, plus . . ."

He followed that with a call to Eastwood's personal physician to request the baseline medical data.

What a screwy deal! Old Eastwood picks an attorney to sink his own son, and the son agrees to the charade. Not that he has any options. But there had to be an angle.

The legal computer kept coming back to the possible Constitutional precedents. They wouldn't be enough, not unless the judge assigned were a Constitutionalist, or could be convinced to be one.

Still . . . the profession had been slow to adopt full computerization, perhaps because of the expense involved, and only a handful of firms had the equipment Darrow had. Even Darcy didn't use the console much: said it was a waste of time.

Darrow turned back to the console.

"Decisions from the Circuit. Rank the decisions by judges in numerical frequency of Constitutional citations in their opinions."

"Clarify," requested the console.

"Find me the district judge who bases the greatest part of his decisions on Constitutional cites . . . no . . . cancel that."

That wouldn't do the job. Darrow took two hours to set up the guidelines he needed, but shelved them for the time being. No sense in following that line until Judge Absolem assigned the case.

A week passed before he faxed Eastwood IVth back.

"Didn't I tell you enough?"

"Mr. Eastwood, do you want to beat the government or be a martyr to your father and the Feds?"

"You bastard! What the hell do you mean?"

"Look. I think I can win this for you, at least in the lower court, which will kill the criminal charges. But nobody's ever tried this approach before, not to

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this extreme, anyway."

Eastwood appeared mildly intrigued. "So what is it?"

Darrow did his best to explain.

Finally Eastwood interrupted. "All right. From what I see, it's risky. But you're putting your job on the line, and that's better than you can expect from most shysters. Besides, it's better than stalling and waiting for them to hang me high and dry for years. That's what my old man really wants."

Now . . . if Darrow could just make it work.

Finding Judge Absolem's clerk took three calls.

"Harlan Garthaus. May I help you?"

"Darrow Bryan, with Flush, Fairley, and Forefront. I was wondering if Judge Absolem had assigned the Eastwood, Slyck Oil case."

"Hmmm," offered the clerk.

"I suppose it's likely to be a while longer before a final assignment's made."

"If it's a typical government case," grinned the clerk, "the U.S. Attorney will make three motions for delay, and you'll probably have a few yourself. It's an oil case, and no one likes those."

Alarm bells were sounding in Darrow's head.

"I take it that it's been assigned to someone like Ngaio or Lerata?" Darrow hadn't appeared before either, but both had the reputation of chewing up attorneys and quashing dilatory motions practically before they were made.

"Right. Judge Lerata, and Garrity didn't say a word."

Darrow could guess why. He might as well see if his scheme could work with Lerata. If not, he'd try to angle for another judge.

With Lerata in mind, Darrow headed down to the firm's programming section.

"We can't do that!" was the first reaction of the supervisor.

Darrow knew why—money. Fairley had opposed the expense of in-house computerization. Hank Forefront had been the one who had finally pushed it through by appealing to both Fairley's sense of pride and his paranoia, telling Fairley that they could keep better security with their own system.

Darrow sighed, loudly, and for effect. "Let's look at it this way. You are in the business of computerizing legal research, right? Mr. Fairley wants a good job done on this case, right? Now, for a good job, I need a series of sorts done on every opinion by Judge Lerata. Is that possible?"

"Yes, but—"

"Next, I need a summary of the arguments presented on both sides, with a key-word correlation made between the language in the final opinion and the cites of the winning side. Can you do that?"

"We might have to go time-sharing with Logic/Law and the National Legal Center. Let me put Peters on it."

Darrow spent three nights designing the key-word correlation, but a week later he had a tape and three large stacks of paper. The correlation programming was spotty, which led to more hours refining the correlations. The last step was to tailor his own cites and case to the optimum presentation profile.

In the meantime, the medical records had come back. Test results were conclusive. Darrow congratulated himself

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on recognizing that the Feds had scrambled Eastwood's brains in the period he'd been in custody. The drug residues were there.

As for permanent effects . . . nothing that the Medico-Legal analysts could put their fingers on, but Eastwood's accomplishments and the federal charges didn't square with the man Darrow met.

He persuaded Eastwood to start restoration treatments, with hopes that there would be some effect before the trial, which was approaching all too quickly.

Darrow, worrying about the computer side, finally ended up going down to discuss the procedure with Peters.

"Could you explain it simply, the technical side?"

"Sure thing, Mr. Bryan," said the programmer, who was younger than Darrow by at least ten years. He pushed a short print-out at the lawyer.

"That's a simple, plain language description of the search and comparison plan you asked for. Heck, if anyone had spent the time you did in outlining what you needed, this could have been done years ago. Nobody's ever asked, not according to the National Legal Center."

"You mean, now anyone could duplicate this? Even without our program?"

"Sure thing. Big thing is knowing it can be done."

Darrow smiled.

That night he vocotyped out a short article describing the process and faxed it off to the *Journal, Trial, Civil Practice, Legal Ethics*, and his sister Susan in Taos, who specialized in Ute Indian claims.

If Fairley ever complained, which was unlikely because he never read any of the legal pubs, Darrow would say that he thought the firm wanted its associates to publish. Even if the hastily faxed article weren't published, the word would spread. Susan would use it, he was sure, even if she didn't speak to him. She'd use any angle.

The pre-trial conference that had been postponed once already came. Darrow arrived early.

He watched Ed Garrity walk in. Garrity was the U.S. Attorney prosecuting the government case, and, according to the computer analysis, specialized in *ad hominem* law, where he could set up defendants as evil-doers robbing widows and orphans.

Garrity nodded at Darrow.

"Thrown to the wolves, I see, Mr. Bryan."

"We'll do our best, Mr. Garrity."

From there it went downhill.

"You'll agree to the stipulation that all the facts in the government's brief are correct?" asked Garrity.

"With the exceptions we've noted, certainly, but with the stipulation they do not constitute the entire case. We have additional evidence to offer . . ."

Garrity nodded at that, but objected when Darrow refused to grant any violation of the laws themselves.

"Are you crazy? You grant the facts, but not the law. You can't win a case like this on law."

Garrity stopped giving advice when Darrow waived the jury. He didn't say anything more for the rest of the pretrial conference, just frowned whenever he looked in Darrow's direction.

* * *

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"A Mr. Fiori to see you, Mr. Bryan."

"Fiori? Sounds familiar. Can't place it," he half-mumbled. "Send him in."

"Jim Fiori, Mr. Bryan."

"Darrow, please. The 'misters' belong with the senior partners."

Darrow gestured to the chair in front of his console/desk.

"Have a seat."

Fiori handed Darrow a card before he sat down.

"James B. Fiori, Jr., Associate General Counsel, Perdell Press."

"Your name rings a bell, but I can't say I recognize Perdell Press," offered Darrow, easing himself into his utilitarian swivel.

"I wear a number of hats, Darrow. Just one of them. Call it professional interest. Perdell publishes *Civil Practice*."

The visitor waited.

Darrow looked blank.

"You sent us a rather interesting draft article . . ."

"Oh . . . about the enhanced use of the legal computer system. Did you like it?"

"Very much. My boss was so intrigued he sent me out to talk to you."

"Are you going to publish it?"

"Yes. But not any time soon. Our backlog right now is about 18 months. Reason I'm here is to get answers to some questions that we had. Mind if I ask you about them?"

"Why . . . no. Go ahead."

"You outlined a computer search technique, using key-words, and comparing the language of the opinion to the language of the two briefs. How do you deal with subjectives?"

"Subjectives?"

"Some judges don't like attorneys with red hair. A Latino judge may never rule for an Anglo attorney from Beacon Hill . . . you see what I mean?"

"Ummm . . . yes. But I didn't intend the program to deal with those. You could, if you correlated the attorneys' names against the judges', I suppose. That wasn't the point. It's more a matter of statistics."

Darrow looked at the older man, taking in the tailored suit, the silk shirt and tie.

Fiori nodded. "So you designed the system on an odds basis?"

"Not exactly. To be precise, I made additions to an existing system. But, yes, it works not on certainty, but on trying to figure the best odds for an approach to a given case, a given judge."

"Could you apply the system to get figures on regions?"

"You mean, to see what legal approaches were used where, and the relative success of each?"

"That would be one application. At *Civil Practice*, we like to focus on specifics. If we knew which kinds of suits were occurring where, and what cases attorneys were most successful with, it would make an interesting series."

"In other words, if all the coke cases in Southern California are won by the defendant . . . that's a story?"

"One way of looking at it. Maybe we'd be interested in seeing which kinds of cases are prosecuted, and which aren't, or which cases are dropped at what stage, and what legal arguments are involved with the successes and the failures."

Darrow shrugged.

"That's a different application, but

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it could be done, I'm sure."

"Well," said Fiori, abruptly standing up, "congratulations. You'll be hearing from the editor, I'm sure, and I appreciate your taking the time to chat with me."

"Oh . . . no problem. No problem."

After Fiori left, Darrow leaned back in the swivel, putting his feet up on the console. Why had Fiori come to see him? Maybe he really had something with the computer applications, more than just winning a single case. Maybe he should have looked into selling the idea himself.

Too late for that now, and besides, he had a case to prepare. That was what paid the rent.

Still . . . he thumbed the vidfax Law Directory.

The screen began to print. Darrow scanned the material.

"Fiori, James Bienvenuto, Jr., born Marblehead . . . October 17, 1955 . . . B.A., Tufts University, 1976, J.D., Harvard, 1979 . . . partner, Gerswin, Fiori and Smythers . . . Director, Graystone, Limited, Director and Associate General Counsel, Perdell Press . . ."

"Graystone?" Hadn't he heard something not so favorable about Graystone recently? Bells were ringing, but he didn't want to spend all the rest of the morning tracking down Fiori.

He tapped out Darcy's number on the intercom.

"Hello there, Darrow. What's down?" Darcy put his pipe in the big ashtray and blew smoke at the screen.

"Graystone, Limited. Rings a bell, but can't place it."

"Ah . . . yes . . . Graystone. Holding company for the Ingeonelli family. Very, very clean. Outlet for thoroughly laundered money. How'd you run across them? Didn't know they were involved in the Eastwood case. Aren't, are they?"

"Not exactly, but I'm trying a new computer search technique, wrote it up as an article to expand my pubs record. A fellow by the name of Fiori came to see me about the technique. Asked me a couple of questions and left. Curious. So I thought I'd ask around."

Darcy frowned, picked up his pipe, and chewed on the stem, tapping his fingers on his desk console. Through the vidfax screen Darrow could see the glint of the harbor behind Darcy. Darrow wished he had an outside view, but maybe that would come. If he did well with the Eastwood case. If . . . if . . . if a lot of things.

"Fiori's the top legal man for Graystone. Don't let all the smokescreens tell you different. If he spent the time to come see you, it's important. But, for the life of me, I can't figure out what's so important about a computer technique. Unless there's more to it than you've let on. Or unless it's got a special application for them."

"He said the reason was that they could use some of the programs to develop legal statistics—"

"What?"

"Legal statistics. Graystone owns Perdell Press, and Perdell Press publishes *Civil Practice*."

"Could be, but I'd be careful." Darcy paused. "I don't like computers, think they're overrated. But if Jim Fiori's interested, it's enough to make me take a second look. Can you send me a copy of whatever you wrote?"

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"Sure."

"Let me look it over, and I'll be back in touch. Good luck with Eastwood. Better you than me."

Darrow broke his glance away from the blank screen, leaned further back in his swivel.

Graystone . . . Perdell . . . Ingeonelli . . . mob . . . gray money . . . and computers . . . there had to be a reason, a good one.

He shoved it all into the back of his mind. If he didn't make a good show with the Eastwood case, none of it would matter, and, likely as not, he wouldn't be around to worry about Fiori's visit.

Darrow sat in an old wooden chair in the courtroom, waiting for Judge Lerata, with a seemingly relaxed James Clancy Eastwood IV next to him. Darrow twisted his worn and rolled *Times* between hands already smudged with newsprint. Thinning brown hair drooped across a forehead he felt had gained too many lines too quickly in the past months.

He realized again what a gamble his strategy was. It ought to work, but theory and practice were two different things.

Garrity marched in followed by several younger attorneys, inclined his head fractionally at Darrow, and settled himself at his table.

Judge Lerata gavelled the courtroom to order with one blow.

Darrow put down the *Times*, leaning forward.

"I've taken your motion for delay under advisement," the Judge addressed Garrity, "but I'd like to hear any final remarks the defense might have."

Darrow rose.

"Your honor," he began, his mouth dry, "as we have noted earlier, the Department of Energy and the Justice Department records concerning the charges against Slyck Oil and the defendant go back over 36 months. Counsel for the prosecution was assigned to this case over six months ago, even before my client was taken into custody. More important, this case does not revolve around questions of fact, but questions of law. There has been no recent change in the laws in question."

According to the computer analysis of Judge Lerata, a summary of briefed material appealed to him.

Darrow plunged on. "Finally, according to the Sixth Amendment, as reinforced by the Speedy Trial Act, a man accused should have a speedy and public trial. Since the government has had the benefit of 36 months of preparation, we object to any further delay."

Judge Lerata pursed his lips and peered through his antique glasses at Garrity.

"Does the prosecution have any further arguments?"

"Yes, your honor. We believe that undue haste in a precedential case of this magnitude would not be justified, particularly given the legal ramifications involved. As the Supreme Court ruled in *Beavers vs. Haubert*, the right to a speedy trial is necessarily relative and does not preclude the rights of public justice. Further . . ."

Garrity went on to cite other decisions.

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Darrow punched the stopwatch button. Thirteen and a half minutes later, Garrity sat down.

The Judge turned back to Darrow.

"Mr. Bryan?"

"Your Honor, I would only note in passing that later decisions, such as *U.S. vs. Marion, Barker vs. Wingo, Toussie vs. United States,* and *Freeston vs. Cole,* as well as the Speedy Trial Act itself, emphasize two basic points. First, the defense need not show how delay is prejudicial. Second, delay is calculated from the actual gathering of evidence and the government's decision to prosecute. Therefore, 36 months seems more than enough time, particularly with the resources of the entire Department of Energy at hand, and especially given the prosecution's pretrial assertions that this is an open-and-close case."

"Mr. Garrity, counsel for the defense has summed up the situation accurately. However, because of the requirements of the Speedy Trial Act, some inconveniences may be necessary. Trial will begin at seven A.M. a week from Saturday."

"Your honor . . ." escaped involuntarily from Garrity's mouth.

"Seven o'clock on the sixteenth," repeated Judge Lerata. "That is the first open date and gives you another ten days."

Garrity made it over to the defense table before the judge had put aside his gavel.

"You realize, Mr. Bryan, that this could be a lengthy trial, and I do appreciate the zeal you have shown on behalf of your client. I also wanted to let you know that your insistence on such haste has cancelled the first vacation I've had in three years. I had to make those reservations over ten months ago. I hope you'll provide a good alternative."

Darrow smiled. "I'm afraid you'll be disappointed, sir, but I'll certainly try."

Darrow couldn't feel terribly sorry for Garrity. With the continuing fuel shortages, even bus reservations were hard to come by. Garrity had pulled strings if he'd made reservations only ten months in advance.

"A Ms. Bryan-Keith on the vidfax, Mr. Bryan."

Susan, for Lord's sake. He thought she'd written him off when he'd gone with Fairley and company.

"Susan."

The woman on the screen had boyish, short-cropped brown hair, and old-fashioned glasses which only slightly disguised the near-classic profile marred but marginally by the crook in her nose.

"Dare . . . this time you've really done it. Not only did you sell your soul when you went to work for that legal factory, but this article of yours is going to end up selling mine."

"What . . . what do you mean? I sent it to you so someone wouldn't corner the technique."

"As usual, you didn't think it through before you sent it off to the rest of the world. The best of intentions, but not the best analysis." She stopped, rubbed her right thumb on her chin, then tugged at her ear. "The idea would have come. The time's no doubt right, but for once you did a brilliant and clear explanation without a word of legal obfuscation. How I wish you had jumbled it up. But

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no, every third-rate big money firm in the country will latch onto this, every—''

''Hold it! Hold on. What do you mean?''

''Dare, how can you be that obtuse? Look. You've pointed out exactly how anyone with enough money and a big enough computer can take full advantage of the legal system. You've not only said it, you provided step-by-step directions, a basic 'how-to' manual.''

Susan glared through the screen at her younger brother. Finally, her expression softened.

''Dare, I understand the position you're in. You have to produce, or you get the drop. You want to get ahead, and this looks like the way to get there. But don't you understand? Fine, you have access to a computer and a complete data-processing center. I don't. Neither do most attorneys for the little people.

''Now what can Mort Rainwater do against Amalgamated Agriculture's water diversions when they have a legal computer and your little manual, and I don't? When they can plug in all the steps you outlined and I can't? Sure, I understand the process, but I don't have the resources. It's not the computer, per se. We could probably scrounge that. It's all the programming, all the information. So back to my basic question. What can Mort Rainwater do?''

Darrow shrugged.

''You've got it. Nothing!''

The silence built up.

''What was I supposed to do, Suse? Forget it? I've got an impossible case against the government. Without the technique, there's no chance of winning. We go to court next week, and I don't know that what I've got will even work, but it's the only chance I've got.''

''I understand. But if you've prepared your case as well as you did that article, the poor government attorney doesn't stand a chance unless your client murdered someone right on prime time, vidfaxers and all watching.''

Darrow shrugged again. Susan always put him on the defensive. She was usually right, too.

''Oh, Dare. It's not your fault. Someone would have come up with it sooner or later. And I guess I'm proud it was you. But what it's going to do to the practice of law I don't even want to guess.''

After her call, Darrow sat for a long time, looking at the wall.

Maybe she was right this time.

Some of the ramifications were obvious—the shuffling of attorneys within firms as the defense and prosecution tried to match strengths, the power plays in trying to get a particular judge for a particular case, the increasingly trumped-up reasons for venue changes as the prejudices and inclinations of judges were laid out in black and white.

What about computers? Did they already make a difference? Would his programs make it worse?

He accessed the Law Directory.

First, he tried his own firm. The entry he wanted was buried, but it was there. ''(c11)'' stood for ''computerized legal library.''

Within an hour he had the listing of the 20 firms in the country with the complete computerized systems like his own firm's. Just 20, including, interestingly enough, Gerswin, Fiori and

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Smythers. Then he pulled the 200 largest firms without the "(c11)" listing, and vocotyped out the comparisons he wanted.

He carried the package down to Peters in Data Management.

"Compared to the last request, this one's simple enough, Mr. Bryan. Should be ready first thing in the morning."

Because he didn't sleep well, Darrow was up early enough to catch the 6:10 RT-8 and was at the closed doors of Flush, Fairley and Forefront by 7:30. For the first time in years, he actually unlocked the doors himself.

Data Management called him at 8:05, and he was back at his desk with the print-outs in minutes.

The first page was enough, but he plowed all the way through to the end. He read the summary twice—the second time out loud.

"The 'c11' firms obtained favorable rulings in 72.1 percent of their cases actually tried. The non-'c11' firms obtained favorable rulings in 37.3 percent of such cases."

There was more, with the usual statistical caveats, but what it boiled down to was simple. The firms with money to computerize were already twice as successful as non-computerized firms. Was it because successful firms adopted new techniques faster? Or was it because the computer made the difference?

Darrow frowned. It made no difference. In either case, the gap between the two would widen because a non-computerized legal firm couldn't use the techniques if it wanted to.

Darrow knew he wasn't the best legal mind. Imagine what Darcy could do with the techniques. That was only the beginning.

What about other applications? What if someone hired a computer to find out what crimes were the easiest to defend? Or what laws were never upheld? Or in which localities crime paid the most? Would the big money boys use the computer to select the judicial candidates they presented to the politicians?

Public defenders wouldn't have computers, would they? Neither would attorneys from rural areas. The fees of "computerized" law firms would jump to pay for the hardware and software. But the clients would pay, especially once they saw how the technique brought results.

The upcoming trial wasn't just a case, Darrow reflected, but the test run of the whole system he'd planned.

If he won this way, did he deserve to? Would it prove Eastwood's innocence? Then again, had the system ever proved that? Or did it prove who had the best attorney?

"Darrow," Darcy began as he edged his head into the cubicle, "have a minute?"

"Sure. Welcome to my humble abode."

"Not much longer, I suspect. One way or the other."

Darrow nodded and waited.

Darcy grinned. "If you don't smoke a pipe, the 'nod and wait' technique is the next best one."

Darrow grinned back, before the impact of Darcy's words sank in.

"The techniques for the Eastwood case are a make-or-break thing?"

"Right."

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"Cost?"

"Hank Forefront got the bill for your programs. If they work, you'll get partnership status."

"And if they don't, the front door?"

"Not quite so bluntly, but essentially, that's correct. Good thing I had that article. Since I'm nominally your supervisor, Hank checked with me before coming to take off your head."

Darcy shook his head wryly.

"Between you and me, Darrow, until this came up, I wouldn't have bet a dollar on your chances. If it works, they can't afford to let you go. And if it does, even if they did, a dozen firms would offer you something. So . . . if you produce, you're golden."

Darrow repressed a smile.

He liked Darcy, but the protection he'd gotten from the older attorney this time would certainly be repaid if Darrow succeeded. Darcy would claim that he was following Darrow and would be rewarded for encouraging him. Darrow might get partnership status. Darcy might reach senior partner status on the basis of Darrow's work.

And it all rested on the trial.

The trial got underway quickly, more quickly than Garrity had anticipated, Darrow suspected.

From the Defense table, Darrow surveyed the crowd, trying to pick out familiar faces. Not that it was all that difficult—only a handful of people were on hand for the opening statements.

With a shock, Darrow recognized Jim Fiori, conferring with another man he didn't recognize. Fiori looked up, as if he had felt Darrow's stare, grinned, and gave back a "thumbs up" signal.

By agreeing to most of the facts, Darrow had stripped Garrity of his strongest weapon. Nonetheless, Darrow had to object to drive the point home.

". . . and the government will prove," thundered Garrity, "that the accused did in fact heinously and willfully violate the law by importing over a million gallons of heating oil every month in foreign ships—"

"Objection. Facts are stipulated, and the character of the accused is not the question. The question is the law."

"Sustained," ruled the judge.

". . . Congress in its wisdom did choose to protect the American people by enacting such protective safeguards, disregarded so cavalierly—"

"Objection. Question is not the intent of Congress nor the character of the accused, but whether the law applies."

"Sustained."

After a series of objections, Garrity wiped his streaming face and turned to the bench.

"Your honor, while I realize fully that the distinguished and honorable counsel for the defense is defending his client to the best of his considerable ability, I would like to inquire if the purpose of these continual objections is the furtherance of the law of the land or its obfuscation."

"Mr. Garrity, the counsel for the defense has generously agreed to virtually all of your stipulations in order that we may concentrate on the legal questions. If you feel that additions to the stipulated facts are necessary at this point, you may make such additions. Counsel for the defense retains the right to object to irrelevant material."

"In that case, your honor," returned

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Garrity, "we will emphasize the basic legal grounds for the government action. According to the Oil Import Act of 1983, the controlling interest of any foreign-incorporated or foreign-based business or corporation, engaged in the production, refining, transportation, or distribution of petroleum products in the United States by any U.S. citizen is prohibited. Section 503 is absolutely clear in its intent . . ."

Garrity devoted the rest of Saturday to the intent of Section 503, all of Monday to the intent of Section 801, all of Tuesday to the intent and applicability of Section 803(b), and all of Wednesday to a listing of successful government prosecutions of violators of the various oil control laws.

By Wednesday night, Darrow sensed that Judge Lerata was suffering from a case of terminal boredom.

Garrity rested his case on Friday at eleven o'clock.

"The prosecution rests and apologizes for rushing through the applicable law, but we feel that the only possible verdict is conviction."

After a lunch recess, Darrow began.

"Your honor, the essence of our case is simple, so simple I find myself puzzled by the prosecution's arguments. Basically, we contend that, first, the individual rights of privacy of the defendant were violated, and, second, that Sections 503, 801, and 803, so heavily cited by the prosecution, are unconstitutional.

"In reviewing the statutes and the case law cited by the prosecution, one should note that for some reason, not a single case tested the merits of the law itself, and that in all but two of the twenty 'precedential' cases cited, the defendant pleaded 'guilty.' We intend to show not only Article I, Section 8, grounds for invalidity, but also First, Fourth, Fifth, Sixth, and Fourteenth Amendment challenges."

Darrow started with the medical records.

Garrity had already accepted them during the pre-trial conference, and it only took Darrow an hour or so to establish his point.

". . . then what conclusions would you draw from these tests, Doctor?"

"That the individual in question had been subject to persona alteration drugs, probably scopsclertin or a variant, certainly a drug of that generic family . . ."

". . . and why does the Enforcement Branch maintain stocks of Scopsclertin A, Agent Searles?"

"I don't know. That's a matter of policy."

". . . and how does a licensed physician obtain Scopsclertin A from your company, Mr. Armbruster?"

"They can't. We can only produce it under contract for the government."

"Does any other company produce it?"

"Not to my knowledge."

Darrow didn't have to prove the Enforcement Branch actually used Scopsclertin A on Eastwood, just that the government had the drug, that no one else did, and that Eastwood showed signs of the drug in his system immediately after his release from custody.

According to the computer profile, that would satisfy the judge.

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"Objection. Counsel for the defense has not proved that the Enforcement Branch actually administered this drug, whatever it is, to the accused."

"Does counsel for the defense wish to respond?"

"Perhaps I should rephrase the conclusion in strict accordance with the facts, your honor. Scopsclertin A is a persona altering drug. Only the government—in particular, the FBI, the CIA, and the Enforcement Branch of DOE—has access to the drug. My client has no access to this drug. After DOE interrogation and incarceration, my client shows traces of Scopsclertin A. Even two months of restoration treatments have not reversed certain personality changes generated by the drug.

"These facts show that a massive dosage was given at a single time, and that no other drug has identical effects. Again, not even illicit sources, according to the DOE's own agents, could account for such a dosage. Therefore, no other conclusion is possible. Government drugs were used. Since the accused was in government custody at the time, the government is responsible.

"Since the Enforcement Branch claims national security privilege and will not relinquish its original drug logs indicating stock withdrawals, I feel it is only fair and just to give the benefit of any doubt remaining to the defendant and conclude that, in fact, he was subjected to what amounts to a chemical invasion of privacy. Our entire case, however, is not based on this single point—"

"Objection!" Garrity was late.

"Overruled," stated Lerata drily. "Counsel for the defense may continue."

". . . but on the fact that the spectacular evidentiary findings in previous trials have obscured the basic legal questions created by the Oil Import Acts. Compounding this has been the financial pressure exerted by the government in previous cases, since a settlement with the government was usually less expensive for the defendant than even winning a long and drawn-out legal test."

The argument itself was dry. Darrow kept the questions to his limited list of witnesses as brief as possible, referred to the cites in his brief as much as he dared, and tried to keep the actual presentation in the courtroom as short as possible while conveying the impression of massive Constitutional weight, long overlooked, behind his simple points.

Eventually, he had to get to the end.

"To sum it up, the thrust is simple. First, the treatment of the defendant violated his basic rights, as detailed earlier. Second, the provisions of Sections 503, 801, and 803(b) do in fact constitute a duty or impost which is not uniform under any definition, and are thus unconstitutional. Third, the processes by which these Acts are enforced do violate the long-accepted standards for due process. Fourth, the enforcement process and the Acts are designed explicitly to treat individuals with identical property differently, and that is discrimination under any definition, which has long been recognized as unconstitutional."

Darrow couldn't help overhearing Garrity's loud whisper, since it was designed to carry through the courtroom.

"That's a Constitutional argument?"

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Darrow held back a grin. He hoped the judge had heard it also.

The courtroom began to clear, and Darrow was packing up his files into the two cases he'd brought.

"Very nicely done, Mr. Bryan. Very nice."

He looked up to see Jim Fiori.

"Oh . . . thank you. I hope the judge will see it that way."

"So do we." Fiori smiled politely. "But I'm sure he will. We all owe you a great deal, and I'm sure you'll be rewarded. If not, perhaps we'll be able to get together for lunch one of these days."

Darrow smiled back.

"Well . . . I thank you. But let's see how the verdict turns out."

Fiori, impeccable in his pinstripes, smiled again, showing white teeth against dark tan, turned, and left.

Darrow shivered.

Judge Lerata took a month to announce the verdict.

"Ladies and gentlemen, I'm not going to waste time with unnecessary verbiage. The Court finds for the defense on all counts. The details are in the opinion."

The fax reporters were swarming outside the doors.

"Mr. Eastwood, Mr. Bryan! Do you know the basis for the opinion?"

"Why did you avoid a jury trial?"

"What effect will this have on attempts to cut oil imports?"

Eastwood smiled and said nothing, as Darrow had suggested.

"I haven't had a chance to study the opinion," responded Darrow to the directional cones focused on him. "I can only surmise that the judge accepted our arguments that the laws are unconstitutional."

"Why no jury?"

"The question was not one of facts subject to question, but one of law. Judge Lerata has a fine legal mind." Let the damned masses stew over that.

Darrow walked into Jonathon Fairley's spacious corner, feeling the tension behind the bared white teeth and the too-hearty blackslap.

"Have a seat, Darrow. Would you like a vintage '79 cola? Don't brew them that way any longer, you know."

"That would be nice."

Fairley went to the corner cooler and fished out a frosty bottle, opened it with a flair and gently poured the liquid into a large snifter. He presented the glass to Darrow, who nodded in return.

The honorable senior partners, Jonathon Fairley and Henry Forefront, perched on the front edge of Fairley's massive desk like vultures.

"Now tell us, Hank and me, that is, what prompted you to take the tack you did. Darcy's mentioned some of it, but we'd like to hear it straight from you."

"I didn't have much choice. From the beginning it was obvious that the evidence was stacked against Eastwood from one end to the other. Not only that, but someone had been messing with his mind. If he had to take the stand, he was probably conditioned to make a basket case out of himself. No jury in this country would have declared him anything but an oil profiteer, particularly with all the government propaganda—pardon me—media emphasis against American oil companies.

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"I mean, it was cut and dried—forbidden oil importer, guilty, next case. So I figured I couldn't lose by waiving the jury."

"Why did you go with a purely legal defense?"

"That was based on what I had to work with. I was assigned Judge Lerata. According to the computer, he likes facts, plain facts, and plain law. Doesn't go much for rhetoric. If he has a choice, he'll opt for facts, but if he's pushed a little and reminded of his legal duty, he'll go for law, especially references to the Constitution."

The two senior vultures were leaning even further forward, but Darrow paused to take a sip of the vintage cola. He might as well enjoy it.

"But the facts?" protested Forefront.

"The facts weren't too favorable. What Eastwood was doing was legal, but unpopular. So I had to minimize the facts in order to emphasize the law. At the pre-trial conference I agreed to most of the government's basic facts."

"Dangerous."

"Why did you think you had a chance? Sounds pretty shaky."

"The computer analysis was convincing. When I found out Lerata was the assigned judge, I had Data Management run a computerized analysis of his opinions. With a jury, he'll let the prosecution have a fairly free rein. Without a jury, he'll decide a case generally on his interpretation of the facts, bolstered by the law. If he's put on notice that it's a purely legal question, and gently reminded of it throughout the trial, and if the legal arguments are to the point, in something like seventy percent of those cases he decided for the legalist. Seventy percent was the best I could do; so I did."

"Wait a minute. I know Hank thinks the computer is the icing on the cake, and Darcy's briefed him on what you did. Hank says it's terrific. But I got lost along the way."

"Basically, I got data processing to create a series of special programs. The principle's simple. Attorneys have been using it for centuries, but I tried to systematize it. The programs were designed to see what arguments had been successful with Lerata in the past, and under what circumstances."

"What's different? Where did you get the idea?"

Darrow pondered, wondering how much to say.

"Two things are different. First, the computer enabled me to analyze the language. That meant a better angle on what specific points appealed to Lerata. Second, I applied the same principles to Garrity. When I heard he was on the other side, I dug up all his cases and ran them through the computer to see if I could spot a pattern to the ones he'd won and lost."

"And?" demanded Fairley.

Darrow was reminded of a little old man asking for the latest gossip.

"I don't know that it's bad. Garrity does best when he can represent the accused as an evil oppressor of the people. He has the poorest record in pure legal cases, particularly when the government infringes personal rights. That's why I emphasized the drug question."

Darrow shrugged. "All I did was put the pieces together."

Fairley leaned back and turned to Forefront.

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"Really, Hank, this amazes me. Darrow has come up with the greatest tool since partnerships, and he 'just put the pieces together'."

Darrow watched the ideas click together for the two senior partners, could almost see the two of them silently planning the high-powered operation, full-scale data reduction, coding for all major decisions, gathering data on every judge and attorney.

"Take a lot of capital," noted Forefront, "but there's no way we can *not* do it. If we don't, someone else will. Onward or out, that's all there is to it."

Recalling Fiori, Darrow repressed a frown. He hadn't had time to figure out all the angles yet. Right now, he wanted to enjoy the taste of success.

"Could be the greatest legal tool of the century, thanks to our new junior partner here," beamed Fairley.

"Should bring us more back to a rule of law," mused Forefront, "back to when law belonged to the legal profession, the real professionals, and not every civic activist or government hack who came along."

Darrow kept up his smile, wondering about Forefront's remark.

Would computerization mean better law? What did Fiori have in mind? What would he do if someone turned the technique against him?

He finished the cola with a gulp.

"Darrow, Mydra has left the color samples for your new office. You're moving up to an outside corner."

Darrow was glad of the dismissal, smiled, offered his thanks, and left.

He was stopped in the hallway outside his door.

"Two messages for you, Mr. Bryan. From a Ms. Bryan-Keith. She wanted you to call back."

"The other one?"

"There's a gentleman waiting for you. A Mr. James Fiori. Says he wanted to deliver a personal invitation. Very polite. But very insistent. Is he as important as he looks?"

"Yes."

He pushed open the thin door, noticing the color samples on his desk console and James Fiori simultaneously.

"Congratulations, Darrow. Frankly, I wasn't sure old Jon had the sense to offer you what you deserve."

Fiori gestured at the color samples.

"But I can see he didn't waste a minute. Sly old fox knows a good thing when he sees it." Fiori grinned. "We really owe you a lot. And if things don't work out the way you expect, don't hesitate to give me a call."

Darrow nodded and waited, sensing more.

"The real reason I dropped by was to tell you about our new venture, since you gave us the idea. Graystone has just completed the acquisition of Eastlaw Citations.

"That's just the first step. We've also acquired the capability to computerize all the slip opinions not on file, and we'll be starting a subscription service which will supply on a monthly basis all the new opinions, and all the accompanying briefs, plus the key-word correlation feature."

"What about judicial profiles?"

"We're working on that, and on getting permission to use Law Directory material for attorney profiles. Good idea. That's why we'd like to have you on board."

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"I imagine it's an expensive service."

"Very expensive. Pricing hasn't been worked out, but I'd estimate that the cost would add ten to twenty percent to the fee structure of the average firm if it were passed on. But it's worth every penny for the firm that does a lot of trial work."

Fiori stood up.

"Think about it, Darrow. Ten years from now, maybe, they'll make you a full partner. I'll start you at that. And Graystone is going places. We could even end up buying out old Jon and Hank."

Darrow smiled and stood.

"I appreciate your thoughtfulness, and I certainly will think it over."

"Anyway, Darrow, my congratulations. Hell of a job you did on Garrity. Haven't enjoyed watching the government get theirs so much in ages. Like to see you do that for us. See you later."

After the door closed, Darrow looked down at the color samples, at the worn fabric of his jacket, and at the blinking light on the console reminding him to call Susan.

As usual, she'd been right.

Rule of law was right, too, but whose rule? ■

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Thomas A. Easton

DECLINE AND FALL

How can we tell whether we're being very slowly poisoned?

Once upon a time, there was a civilization that used lead for water pipes, in paint, and as a portion of food containers, and pumped vast amounts of lead compounds into the air. In time, the people of this civilization noticed widespread learning and behavior problems in their children. Once renowned for their technical abilities, they found their innovativeness slipping. Facing problems of resource shortages, they felt themselves impotent.

Once upon a time, there was a civilization that used lead for water pipes, wine vats, wine cups, eating utensils, and other objects that came into intimate contact with the human body. The people of this civilization are thought to have suffered from the psychological effects of lead poisoning—disturbed learning and behavior, among other things. In time the civilization foundered in a morass of governmental incompetence, unable to withstand barbarian incursions.

The latter civilization was that of Rome. The Latin word for lead was *plumbum*. From that word, we get the English "plumbing" and related terms.

The former civilization, of course, is our own. We haven't gone the way of the Romans yet, and we may not, but there are disturbing signs of decline. We are concerned about a decline in industrial innovativeness that lets other nations forge ahead in the struggle for markets and productivity. We are concerned about unruly youth and high crime rates. We blame tax policies and government regulation, which are said to inhibit R&D spending, for the first

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problem; and social ferment and lenient penal systems for the second. We may be right to finger these causes, but there is a neglected factor that may be as or more important, a factor that can lower intelligence and foster abnormal behavior. There are some disturbing data on the prevalence, extent, and impact of lead poisoning, all of which now seem much broader than they used to.

The full range of the effects of lead poisoning is only now becoming understood. As recently as 1959, a toxicology text could give the symptoms as follows:

If one swallows large quantities of soluble lead salts, one experiences vomiting, colic, and diarrhea followed by constipation, but such "acute" lead poisoning is rare. More common is "chronic" poisoning due to continued exposure to lesser amounts of lead. Chronic symptoms may include weight loss, loss of appetite, fatigue, metallic taste in the mouth, malaise, weakness, pasty gray complexion, excitability, and anemia, as well as colic, vomiting, diarrhea, and constipation. Chances of recovery are good if the poisoning is not severe. Death usually results from the general weakening the poisoning produces, leaving the victim subject to infections or heart problems. However, the nervous system may be damaged, producing tremors, pain, and paralysis (when severe, these symptoms constitute "lead palsy," once an ailment of printers, painters, and others whose work exposed them to lead). Children may develop lead encephalitis, caused by brain tissue damage and marked by headaches, insomnia, irritability, eye and mouth tremors, hysteria, loss of memory, unconsciousness, hallucinations, and convulsions. The symptoms often strike suddenly; mortality is high; recovery is often only partial. A telltale sign of lead poisoning is the "Burtonian line," a black line on the gums near the border of the teeth.

However, these symptoms are rarely seen, especially today. The problem of lead poisoning has been recognized for years now, and many of the most obvious sources of lead—such as lead-based paints—have been controlled. Still, about 200 children die every year of lead poisoning in this country, and 12–16,000 more are successfully treated, while perhaps half a million suffer from lesser degrees of poisoning and consequent disability. Many of these children live in old houses whose walls are covered with paints containing lead-based pigments. They inhale lead in dust (urban dust may be one percent lead) and eat flakes of paint. For this reason, wall paints must now contain no more than .06 percent lead.

The rest of the half million—and all the rest of us—get their lead in less obvious ways. Gasoline has its octane rating boosted by the addition of tetraethyl lead. When the gas is burned in automobiles, most of this lead is exhausted to the air as lead bromide, to the tune of 150,000 metric tons of lead per year in the U.S. alone (1975 data). This lead reaches human beings in the air they breathe, the water they drink, and in foods grown in lead-contaminated soil. There is also lead in tobacco smoke, in the pigments of inks used in printing gift-wrappings, magazines, and even

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second-grade children, analyzed them for their lead content (which varies with the amount of lead in a child's body), and correlated the results with teachers' ratings on eleven aspects of behavior. "Negative" behaviors (distractibility, lack of persistence, dependence, disorganization, hyperactivity, etc.) all increased with the level of lead in the teeth, and high-lead children performed less well on intelligence and ability tests. As a result, it is all too apparent that even in children who do not show any of the classical symptoms of lead poisoning, the presence of lead in the body has detectable adverse effects. We can expect that the government will eventually be forced to lower the acceptable blood lead level, and the maximum lead levels for air, water, food, and potentially ingestible products such as paint, even further. Ultimately, the acceptable blood lead level will be much lower than the present 30 μg/100 ml.

How low is low enough? It is impossible to say at present, and there may be no truly safe level, no level at which adverse effects due to lead are completely eliminated. The data do not indicate that there is a blood lead level without an associated behavioral or learning deficit. There is, however, a natural level of lead indicated by measurements of prehistoric human remains, such as 1800-year-old Peruvian skeletons. In terms of dietary intake, this level is something less than 2 nanograms (ng; 10^{-9} g) per gram of food, or 210 ng of lead absorbed into the body per day (only 10-50 percent of ingested lead is absorbed). In contrast, the modern American diet includes about 200 ng/g of lead, for an absorption of 29,000 ng/day, fully 100 times the presumably safe prehistoric level, to which we are adapted by eons of evolution, and two-thirds of the 300 ng/g medical authorities consider the maximum permissible amount of lead in food. (Thanks to the lead in air, a food level of 500 ng/g is equivalent to 700 ng/g, a level sufficient to build up toxic amounts of lead in the body in about four years.)

The "natural" level derived from studying the Peruvian remains is probably somewhat high. By 200 A.D., the human species had already been producing lead (as a by-product of silver smelting) for three millennia. Lead production ran at about 160 tons per year from 2000 B.C. to 700 B.C., jumped to 10,000 tons per year when people began to use silver coins, and rose to 80,000 tons/year two millennia ago. It is now about 3 million tons per year.

Clearly, the human species is being exposed to much more lead today than ever before in its history, but lead-containing fumes and dusts have been circulating in the planet's atmosphere and waters and adding to the human body's burden of lead since long before the time of the Peruvians. Even they were exposed to some excess lead, and the true "natural" level must be rather less than what we find in their remains. And it seems not unreasonable to suspect that any amount of lead above that "natural" level inflicts upon us some degree of handicap, largely mental. This handicap seems to derive from the way lead can replace calcium in metabolic pathways and disturb the synthesis of heme

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newspapers (all of which children may eat). Lead even finds its way into foods from processing machinery and the solder that holds tin cans together.

A great deal of current research emphasizes the effects of lead on children. Why don't the researchers study the effects on adults too? Don't adults get exposed to lead? Of course they do. They breathe the same air, drink the same water, and eat the same food (though they don't eat paint chips), and they have their occupational exposures as well. But children are more sensitive to toxic substances and, because their nervous and other systems are still maturing, they are vulnerable in other ways. This became amply clear in 1943, when Drs. Elizabeth Byers and Randolph Lord of Boston found that even after children had supposedly recovered from acute lead poisoning, they continued to show behavior problems and sensory-motor defects. In addition, laboratory work has shown that when rodents are given lead during their first 11 days of life, they show slow learning; older rodents show similar effects only at four times the dose. Another study showed that rats given too little lead to produce visible anatomical changes in the brain still showed fewer interconnections between brain nerve cells. A third study demonstrated that lead retards brain development when given before birth. These effects are insidious, for even if the lead is removed later in life, the brain may never recover fully. Exposure to low levels of lead may produce a permanent mental handicap.

How serious is the problem? Until 1970, a safe level of lead was thought to be 60 micrograms (μg) per 100 milliliters (ml) of blood. In 1975, the U.S. Center for Disease Control lowered this to 30 μg/100 ml of blood, while warning that even at this level children may be in trouble. Either level is far below the 600 μg/100 ml defined as a definitely toxic level, but studies have shown that blood lead levels of less than 400-600 μg/100 ml impair visual learning in young rhesus monkeys, that small amounts of lead can interfere with the function of nerve cells and the transmission of nerve signals in the brain, and that lead can even cause birth defects in experimental animals.

As a result of these studies, researchers have begun to examine the effects of low blood lead levels in humans. In New York, Dr. Oliver David studied 589 children 5-12 years old, all ostensibly normal—none showed symptoms of lead poisoning and none had displayed learning problems; their blood lead levels averaged 18.3 μg/100 ml, considered normal for city children. He found that the children's blood lead levels ranged from 10 to 44 μg/100 ml and that their conduct, learning progress, and activity levels varied with their blood lead levels. That is, the more lead their blood contained, even when the amount was well below supposedly "safe" levels, the more behavioral and learning problems the kids had. When the lead was removed with the drug penicillamine, the kids' behavior improved. In fact, the kids' average IQ went up by eight percent.

In another study, Boston's Dr. Herbert Needleman and his colleagues collected the baby teeth of first- and

groups (the vital portions of the hemoglobin that carries oxygen in the blood and of the cytochromes that help make energy available to the body's cells). The former effect may account for the effects of lead on nerve function. The latter may account for its disturbances of nervous system maturation.

The hazard seems clear enough. So why hasn't it been more widely realized? The answer is that only very recently has the amount of lead to which modern humans are exposed been accurately measured. In March of 1980, Dorothy M. Settle and Clair C. Patterson of the California Institute of Technology's Division of Geological and Planetary Sciences published in *Science* their measurements of lead in tuna and a discussion of the problem. Their measurements were of unprecedented accuracy, for they used instruments and procedures first developed for analyzing the samples returned from the Moon in order to minimize the effects of terrestrial contamination. They used ultraclean equipment and ultrapure reagents, even going so far as to run their glassware through their lead-extraction procedure before adding any samples to it and extracting the lead for real. This procedure removed any lead deposited in the glassware during the last washing and any lead that could easily be extracted from the glassware itself.

Settle and Patterson found that fresh tuna muscle dissected and processed in their lab contained only .3 ng of lead per gram. The difference between their techniques and those considered standard in the field is illustrated by the fact that when the tuna was dissected and packaged at CalTech in such a way as to minimize contamination and then sent to the National Marine Fisheries Service (NMFS) for analysis, the NMFS found 20 ng/g. When the NMFS dissected the fish as well, it found 400 ng/g, presumably because of lead introduced from contaminated instruments and reagents. As a result, Settle's and Patterson's work has the effect of vastly reducing the level of lead believed to be "natural" today. They estimate that prehistoric tuna muscle contained only a tenth of the modern level of lead (.03 ng/g).

The CalTech workers also used their ultraclean techniques to study commercially available canned tuna. They found that tuna from unsoldered cans contains only 7 ng/g lead, but that tuna from soldered cans contains 1400 ng/g lead. The difference between .3 and 7 is accounted for by lead in the brine in which tuna are stored on fishing boats and by lead associated with processing machinery. The difference between 7 and 1400 is accounted for solely by the lead in the solder that holds the cans together.

When the NMFS lab measured the lead in tuna from a lead-soldered can, it found only 700 ng/g. If the tuna they examined actually had as much lead in it as the tuna the CalTech workers examined, then the CalTech measurements are both more sensitive to low levels of lead and more accurate at higher levels. As a result, the gap between what people have believed are 'natural' and 'unnatural' lead levels becomes impressively broad. According to the NMFS, processing and canning

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only raise the tuna lead level from 400 to 700 ng/g; according to the CalTech work, they raise the lead level from .3 to 1400 ng/g. The lead we eat in tuna is amplified by processing not 1.75-fold, but 4700-fold; if we compare our diet with prehistoric tuna, the amplification factor becomes 47,000, thanks to lead contamination of the environment by human activities.

Labs such as that at CalTech are rare and expensive beasts, and the work of Settle and Patterson has not yet been repeated, as it will have to be before it is accepted as true. But we can expect that it will be repeated, and we can expect that it will be extended to other foods stored in soldered cans, to the point where we might expect people who eat a great deal of solder-canned foods to be showing the signs of chronic lead poisoning.

I asked before: How serious is the problem? If one looks at lead absorption on a linear scale, there seems to be a great spread between typical (*not* normal) levels of lead absorbed from the diet (29,000 ng/day) and acutely toxic levels (just under 150,000 ng/day). But if one looks at the problem on a multiplicative scale, one sees immediately that we now absorb more than 100 times the natural level and we need only multiply present levels by five to reach acute toxicity. That isn't much of a safety factor, and the evidence indicates that we are already well above the "no effect" level and well into the range of chronic insult, where lead's harmful effects are not obvious but do exist. We are already suffering lead-induced biochemical, neurological, and behavioral handicaps of some degree, and by "we" I mean all of us, children and adults, male and female, New Yorker and Andaman Islander, just and unjust.

Is there an answer? I doubt it is feasible to impose clean-room standards on the food-processing industry, and I know it is not feasible to dose everyone regularly with lead-removing drugs (they are toxic). Then too, the Earth's soil and water carry a burden of lead we have put there with our automobile and industrial emissions, a burden that will show up in our food and drink for years—generations—to come. We are stuck with some degree of lead-induced handicap. We can only pray that it is not so bad as to threaten our survival and strive to keep it from growing worse.

The problem will ease if we can switch to other fuels than leaded gasoline for transportation. It will ease still more if and when we move polluting industries into space. It may ease the most if we simply ban soldered cans and turn to aluminum or glass (both of which have the additional advantage of being readily recyclable) to store our food. But we are not about to return soon to the "natural" levels of dietary lead of our prehistoric ancestors.

And I wonder. Crime is up, international animosity is up, industrial innovation and productivity are down, all phenomena that would seem to relate to the symptoms of subacute lead poisoning—learning impairment, disorganization, hyperactivity, lowered intelligence, etc. We can say the problems I cite are amply explainable in other terms—there is nothing new about

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them—but we can also ask, has our poisoning of ourselves impaired our ability to cope with the demands of modern life, with the need for intelligence, cooperation, and industriousness? Have we impaired our ability to survive the crises that confront us? Are we on a path to stagnation, to a Dark Age that will end only sometime after our environment has purified itself of the lead we soaked it with?

In general, human beings have great untapped reserves of competence. They have a way of rising above the dooms of prognosticators, a way of proving problems less fearsome in retrospect, so that we can hope, we can trust, that the answers to the above questions are, "No." But lead is a poison, it does burden our bodies far beyond what our evolution has equipped us to deal with, and its low-level effects strike at the nervous system. Lead undoubtedly gives us a handicap, even if the handicap is no more severe than a limp. A person can limp through a marathon and reach the goal, but that person will need more time and will suffer more.

Think what you can do without a limp.

Think what we might do with brains free of lead.■

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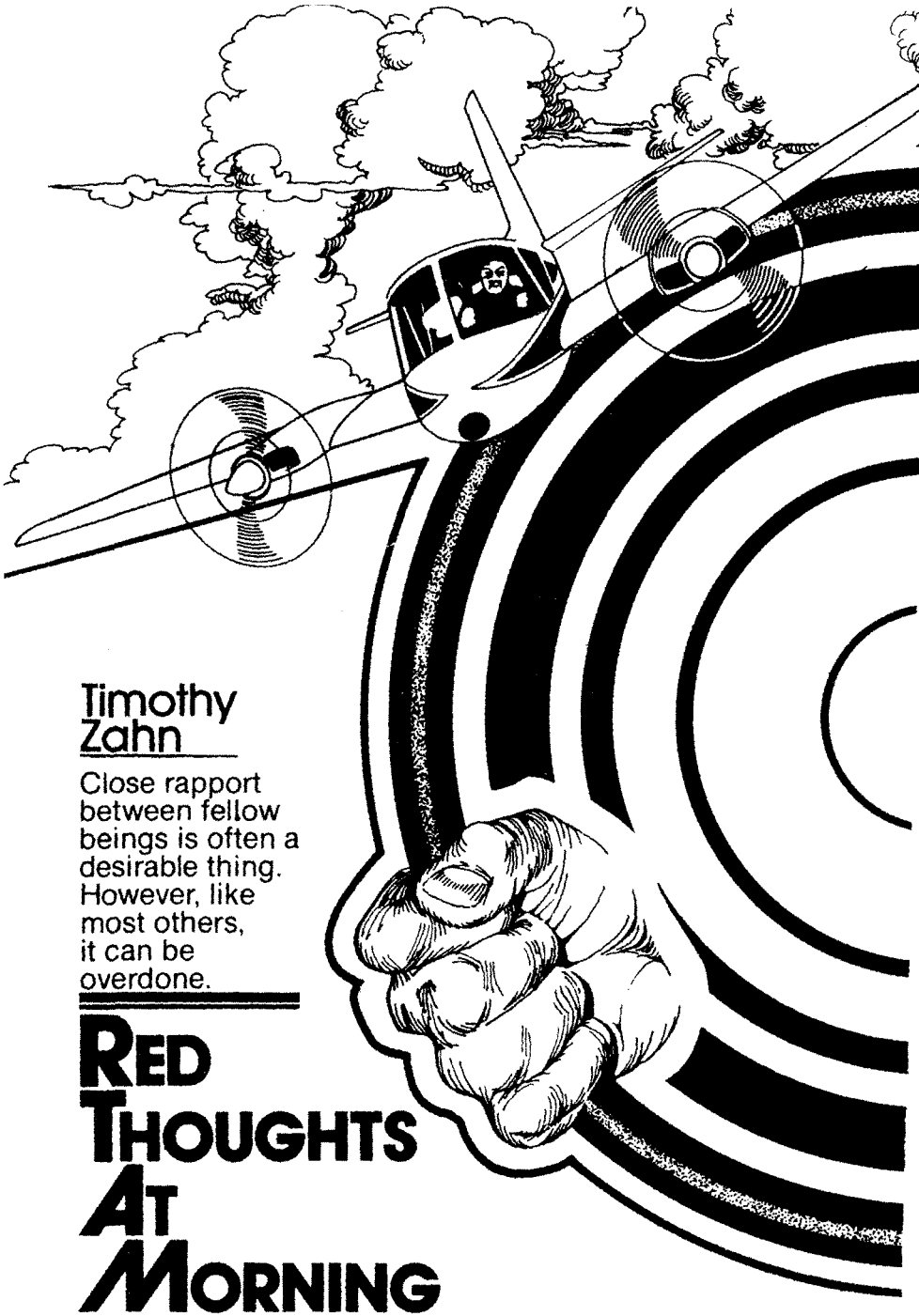

Timothy Zahn

Close rapport between fellow beings is often a desirable thing. However, like most others, it can be overdone.

RED THOUGHTS AT MORNING

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It had been one of those long, frustrating days, the kind that makes you feel like the dish rag at a greasy spoon, and I wasn't in any shape for the headline that jumped out at me as I opened my *Des Moines Register* that evening: TELEPATH KILLED IN HIJACKING.

I stood there, just inside my apartment door, rainwater running off my coat onto the rug, and read the first few paragraphs. Amos Potter, of Eureka, California, had been on a commuter flight from San Francisco to Los Angeles when three men at the other end of the plane produced guns and a bomb and demanded to go to Cuba. The pilot had obediently changed course, but had had to set down in Las Vegas for fuel. Police and FBI men had stormed the plane, killing all three hijackers and wounding four passengers. Amos hadn't been found until it was all over: he'd been stabbed in the heart with one of the galley's steak knives and left in one of the lavatories.

Tears welled up in my eyes and I tossed the paper aside. I'd never met Amos, of course; never even been within two hundred miles of him. But he'd been a sort of elder statesman to the rest of us, the embodiment of easy dignity and high moral character, and it was largely because of him that we had won any tolerance at all from the world.

I made my way to my couch and collapsed onto it. *Colleen,* I called.

Yes, Dale. She must have been expecting my call. *I've seen the news, darling.*

Why didn't you call and tell me? The news at noon mentioned the hijacking, but I didn't know Amos was aboard. Or . . . any of the rest of it.

Maybe I should have called you. Her thoughts wrapped soothingly around my pain, the telepathic equivalent of taking me in her arms. *But I knew you were going to have a rough day, and I didn't want to dump this on top of you at the same time. Did that go all right?*

More or less, I told her. *Both sides spent the whole day arguing legal details before the judge. I got to sit there and listen to them discuss my abilities and ethics as if I wasn't there. When I wasn't being insulted I was being bored. Hardly seems important now, though, does it?*

I know, she agreed soberly. *Did you know Amos well?*

Not really. I felt her smile, and couldn't help smiling myself. It was truly the sort of answer a telepath would give: only when you don't know how complex human beings really are do you lightly state that you "know" someone. *I couldn't reach him in Eureka, of course, but he used to come to Pittsburgh or Louisville once or twice a year, and I always talked with him for a few hours then.*

Me too. I used to feel a bit isolated up here in Regina; you remember how I used to fly to Salt Lake City a couple of times a year just to talk with him. I'm going to miss him.

Yeah. We all are.

For a few minutes we sat silently, maintaining contact without words. Colleen's presence had a warm, comforting texture to it, and slowly the tensions of the day began to fade. Finally, I stirred. *Have you discussed arrangements with any of the others yet?*

A little. I talked to Gordon in Spo-

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the thoughts at all I hear them clearly. Always."

He started to ask something else—and right then, for no particular reason, the crucial question hit me like a Trident missile.

How the hell do you unexpectedly stab a telepath?

It *had* to have been unexpected; the lavatory door had been unlocked and the paper hadn't mentioned any signs of a struggle. But that was impossible; given the circumstances, Amos was most certainly reading out to his full range. So why hadn't he seen the killer coming?

Urban had finished his question by the time I made up my mind. "Excuse me," I said, pulling out my handkerchief and pretending to clear my sinuses. I didn't want to just go glassy-eyed on them, after all; I've learned that sort of thing can be disconcerting to people. But safely hidden behind the handkerchief, I could make my contact. *Calvin? Calvin, are you there? Calvin?*

Right here, Dale, came the calm thought. *You sound agitated.*

I'm getting there, I agreed. *Listen, you've got the location log this quarter, right? Can you clear me to Las Vegas tonight? It's important.*

From Des Moines? That was Calvin—no unnecessary questions asked. *Any direct flight would bring you too close to Pueblo, but I could move out of town for a few hours if necessary.*

No, it's not worth that. Besides, I doubt there's a direct flight, anyway.

Then if you go via Denver or Salt Lake we should be all right.

Great. I'll make some reservations and get back to you as soon as I know my schedule.

All right. Oh—and you'll have to be out of there by six tomorrow evening. Gordy's flying down to escort Amos back to Eureka.

Yeah, okay.

Calvin was getting curious. *I trust you'll tell me what all this is about sometime.*

Sure, but later. I've got to go now.

Talk to you later.

I slid my handkerchief back in my pocket. Already I felt better. "Now, what was that question again, Mr. Urban?"

I got through the rest of the morning without any real trouble. During lunch break I called a travel agent and he worked out a pair of connecting flights that would get me into Las Vegas by ten. That was later than I'd wanted, but my option was to wait until after Gordy had come and gone. This way I'd have at least most of tomorrow before I had to leave town.

The judge and lawyers weren't happy about my announcement that I was taking a few days off, but they accepted it with the grace of reasonable men who have no real choice in the matter. By seven-thirty that evening I was on the first leg of my flight . . . and by eight we were circling Denver, just a hundred miles from Calvin's home in Pueblo.

It's a strange sort of sensation, and more than a little scary the first time you experience it. Even a hundred miles apart, Calvin and I were now close enough that it was no longer possible to block our surface thoughts from each other: to tune each other out, so to speak. It's the same thing that happens

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kane, and he thought the only fair way was to let all of us draw straws to see who'd get to go to Eureka and attend the funeral.

No, I shook my head, *it should be between those who knew Amos best. That would be Gordy and Nelson, I guess.*

Colleen shifted uncomfortably. *Do you think it would be wise to let Nelson go? I mean . . . you know how he gets sometimes.*

Oh, he'd be all right, I assured her. *He was only mildly paranoid to begin with, and living in San Diego's been good for him. Every time Amos went down to Los Angeles he improved a little; some of Amos's calmness had to rub off at that distance.*

All right. She was willing to concede the point. *Do you want me to suggest that to Gordon?*

If you would. I thought for a second. With Amos gone, Gordy was out of touch with everyone except Colleen. *I'll call Calvin in Pueblo and have him relay the message to Nelson.*

You feel up to that?

I smiled. *Yes. Thanks for always being there when I need you, Colleen.*

Thank you, she said quietly, and I knew then that she'd received as much comfort from me as she'd given.

I love you, Colleen.

I love you, Dale. Good-by.

We broke contact. I'd loved Colleen for nearly three years now, and she'd loved me even longer. And the knowledge that we would never meet each other was a dull ache permanently lodged in my throat.

What a stinking world.

Sighing, I got to my feet and headed for the kitchen to see about some supper.

I slept poorly that night, and was back at the Des Moines courthouse at nine sharp the next morning for another day of arguments. In one sense the question before the court was straightforward: the judge had simply to decide whether or not my testimony as a telepath could be admitted as evidence in a robbery case. In practice, however, the legal issues and ramifications surrounding the whole concept formed a jungle that made the Amazon basin look like the pampas. My mood this morning wasn't helping a bit, either; it was dominated by depression, fatigue, and some unknown beast nagging at the back of my mind, and all I wanted to do was to crawl back into bed. I wished to heaven I'd never let the D.A. talk me into this.

Today, for the umpteenth time, Urban, the public defender, wanted to hear about my range. "Think of it as listening to someone whispering," I told him once more. "Within two or three feet I can't help but hear someone's thoughts. Farther away, up to about twenty or twenty-five feet, I can choose whether or not to listen; beyond that, I can't hear at all."

"Except with your fellow telepaths, of course," Urban said briskly, as if I needed reminding.

"The defendant isn't a telepath," I pointed out as patiently as possible.

"Of course not. Now, you referred to this as akin to hearing whispers. We all know how easy it is to misunderstand whispers sometimes—"

"The analogy referred to range, not accuracy," I interrupted. "If I can hear

when a telepath and human are only two or three feet apart, but with the extra complication that it's a true two-way communication. If the plane now suddenly turned due south and Calvin and I got even closer . . . but that wasn't something I wanted to think about.

Of course, as long as you didn't panic, the effortless communication provided by a close approach was a good opportunity to talk. Calvin and I spent quite some time doing just that, discussing life in general and ourselves and our fellow telepaths in particular. But he couldn't hide his curiosity about my sudden trip, just as I couldn't hide my somewhat perverse decision to make him bring up the subject first.

Calvin cracked first. *All right, you win,* he said at last. *You're not going to Vegas just to say good-by to Amos—I can tell that much. So?*

You're right. I explained as best I could the questions I had about Amos's death—not an easy task, since a lot of my feelings hadn't really made it to verbal level yet.

He mulled at the problem for a bit after I finished, his thoughts an orderly flow of question, possibility, and logic. *Interesting,* he said. *I agree; something here doesn't ring quite true. I don't know, though. Suppose one of the hijackers recognized Amos, decided to kill him to cover their trail, and threatened to kill some of the other passengers too unless Amos went quietly? He was nobler than the rest of us put together, and I could see him giving in under those circumstances.*

Maybe, I said slowly. *But I still don't like it.*

I can tell, Calvin came back dryly. *You're broadcasting uneasiness over two states. Look, I doubt that there's anything sinister going on here, but I agree it ought to be checked out right away. Let me know if I can help, okay?*

You'll be the first I call. I assured him.

Good. Oh, one other thing you may not have heard about yet: the question's been making the rounds today as to whether or not we should ban commercial air travel by our members.

I thought we settled that issue years ago.

We did, but it's getting another look. If there's going to be a resurgence of hijackings, the margin of safety's going to be all fouled up, and it may be smart to stick with trains or private planes for a while. Suppose, for instance, Amos's plane had been diverted to Pueblo or Des Moines instead of Vegas.

We both shuddered. *Yeah,* I agreed soberly. *But I think the risks can be minimized.*

Yeah, well, I'm not going to debate it with you now. Just think about it, and we'll all discuss it together in a week or so.

Okay. I'd better enjoy this trip, I thought glumly—it might be the last I could take for a while.

Fine. Well, you seem pretty tired, so I think we should break now. I'll talk to you later, Dale.

I glanced out the window in mild surprise. Our layover was over, and we were once again airborne. Beneath the plane the ground was dark; Denver was far behind us. The close approach was over. *Good night, Calvin,* I said, and broke contact.

I dozed the rest of the trip, trying to

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ignore the peculiar looks and even more peculiar thoughts the stewardess kept sending my way.

Sometime during the middle of the night I decided I hated Las Vegas, and that first impression was solidified the next morning during my taxi ride to police headquarters. It wasn't just the high proportion of the criminal element roaming the streets: every city has some of that. Rather, it was the greed, gold-lust, and despair I could sense all around me. This was a frantic town, a city founded on hedonism and life's more transient gains, and it simultaneously angered and depressed me. It seemed grossly unfair that Amos Potter, a man who had loved the quiet outdoors and had spent his life helping others, should have had to die here.

But the police, at least, were courteous and helpful, and I was routed to the proper officer with a minimum of delay. He was a squat, muscular man with a swarthy complexion and the unlikely but circumstantially appropriate name of Lieutenant James Bond.

"Honest," he insisted as he gave me a quick handshake. "What can I do for you?"

"My name's Dale Ravenhall," I told him. "I wanted to ask a few questions about the recent death of Amos Potter."

He recognized my name and drew back almost imperceptibly. "I see. I'm sorry about Mr. Potter. Was he a good friend of yours?"

"We are, by necessity, a somewhat tight-knit group," I said. "Are you the one who found Amos on the plane?"

He shook his head. "One of the SWAT team discovered the body." His mind flashed the man's name—Sergeant Tom Avery—which I filed away for future reference. "I was called in right away to head that part of the investigation."

"Were there any signs of a struggle? The newspapers didn't mention any."

"No, there weren't, and that's something I don't understand. You people are supposed to read minds at a pretty good distance, right? So why didn't Mr. Potter lock the door?"

I scowled. "I don't know. That's one of the things that bothers me about this."

"What are the others?"

"The lack of struggle, for one," I said, sensing even as I ticked off my list that he had many of the same questions. "The use of one of the galley knives for the murder when they had guns. How come they were clever enough to smuggle those guns aboard in the first place, and yet got themselves killed on their first stop."

"You missed two important ones," Bond said. "Why did they pick a puddle-jumping commuter plane from San Francisco, of all places, to hijack to Cuba? And why didn't Mr. Potter contact one of you people before he died?"

I frowned. That last hadn't occurred to me. "I don't know. I was too far away myself at the time, but maybe he *did* talk to one of the others. I can check on that right now, if you'd like."

Bond had never watched a telepath in action and wasn't sure he wanted to start now. But professional considerations outweighed any squeamishness. "Go ahead; I'd like to know."

From my close-approach contact with Calvin last night I already knew Amos

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"I've heard rumors that you people can . . . well, force normal humans to do what you want. Is that true? And if so, why didn't Mr. Potter stop the hijacking?"

"It's true, in about the same way the CIA and certain religious cults can impose their will on people. It would take almost continuous contact between telepath and subject for several days straight to accomplish it, though. Amos couldn't possibly have done anything in the time he had."

"Hmm. Okay. I'm surprised the CIA hasn't shanghaied you, though. You sound like you'd be handy to have around."

"Some of us have been tested by various agencies. There are drugs that are faster and easier to use. Look, we're getting off the subject. Is there anything else you can tell me about Amos's death or about the hijacking in general?"

"Sorry." He shook his head. "You've got all the obvious facts; the others will have to wait for the lab work. If you'll give me your number, I'll get in touch when I know something more."

"I'd appreciate that." I wrote my Des Moines number on a card and, for good measure, added Calvin's. "I may be moving around in the next few days, but Calvin Wolfe here will be able to relay any messages."

"Fine." He gave me a thoughtful look. "Nelson Follstadt's closer, you know. Don't you trust him?"

"Sure I do. I just—well, Calvin's a closer friend."

"Yeah. Well, thanks for stopping by, Mr. Ravenhall. I'll be in touch."

"Thanks." I shook his hand again and left.

His last question bothered me all the way back to the hotel. Why *hadn't* I given him Nelson's number? —Especially since Nelson was closer to Eureka, where I had already more or less decided to go next. Was there something about that last contact I'd had with him that had bothered me? Certainly, Nelson had been nervous, but that was normal for him . . . wasn't it? I was beginning to regret having broken off the contact so quickly. My chance was now gone for further questioning; if I called back with the same questions I was likely to stir up Nelson's quiescent paranoia, and I couldn't take that just now.

I glanced at my watch. It was nearly noon. Flopping onto my back on the bed, I closed my eyes. *Calvin? Yo, Calvin?*

Hello, Dale. Learned anything interesting?

Yes and no. I've found the cop in charge of the investigation has some of the same questions I do, but he doesn't have the answers either. Is Gordy still due in here at six, and when is he heading over to Eureka?

Yes, and tomorrow morning.

I need a favor. Would you ask him to delay either leg of his trip by twenty-four hours?

Well . . . I suppose I could ask him. Why?

I'd like to go up to Eureka myself and look around. No particular reason, I added, anticipating his next question. *I'd heard Amos had suspended his psychotherapy practice and was working on something special. I'd like to check it out.*

I can save you some trouble, if that's

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hadn't contacted him before his death. Gordy was a long shot; I tried briefly to get him, but the distance was a shade too great. That left only one possibility. *Nelson? Are you there, Nelson?*

Yes, of course, Dale. What is it?

If Colleen's mental texture was one of warmth and love, and Calvin's one of calmness, Nelson's always struck me as predominantly nervous. *I was just in the neighborhood and thought I'd say hi.*

In the neighborhood?

Las Vegas. Light conversation was often lost on Nelson. *Listen, Nelson, I've been trying to track down some questions about Amos's death.*

What sort of questions?

Oh, just some loose ends. Nelson's nervousness was contagious, and I didn't want to prolong the contact. Besides, Lieutenant Bond was waiting. *I wondered if Amos had had a chance to contact you before the end.*

No, he said, almost too quickly. *But I might have been out of range.*

Where were you?

I flew down to Baja for a couple of days. His tone said it was none of my business where he and his Piper Comanche had gone. *I was flying back when the news came.*

Okay, just wanted to check. You doing okay?

Save your sympathy, Dale. I'm fine.

Right. I'll be talking to you later.

Bond nodded when I relayed the conversation. "That was Nelson Follstadt, right? Do you think you can believe him?"

I bristled. "Of course. Why would he lie?"

He shrugged. "I hear he has some psychological problems."

"Well . . . yes, he does, but he's improved a lot lately. And he's been away from the other telepath for nearly ten years, so there's no place to go but up."

"Come again? What other telepath?"

This wasn't really the time for a lecture, but Bond truly didn't understand. And I've always tried to avoid littering my path with mysterious statements and obscure hints. "Oh, well, you've probably heard that telepaths can't get too close to each other. That's because the contact gets stronger with decreasing distance, and the two personalities begin to meld into one. At about twenty miles apart—theoretically—the strain becomes too great and both telepaths go permanently insane."

Neither Bond's face nor his thoughts were very pleasant. "Is that what happened to Nelson Follstadt?"

"Fortunately, no. The telepathic ability grows with age, and it's only as you get into the teens that it becomes strong enough for any risk of insanity to show up. Nelson just happened to grow up in the same city with another fledgling telepath, and before they were identified and split up the small effects had gradually built up into a mild paranoia. But, as I said, Nelson's improving."

"What about the other telepath?"

"He committed suicide six years ago." One of our group's worst failures, I reminded myself bitterly.

"Oh." Bond was silent for a moment, wondering if he should ask his next question. I let him take his time. "There's one other thing I've been wondering about," he finally said.

all you want. According to Gordy, Amos was trying to build some kind of electronic gadget for locating new telepaths.

My jaw dropped. *You're kidding. I hadn't heard a whisper about that. I didn't even know it was theoretically possible.*

Me neither, to both comments, until Gordy told me last night. Apparently Amos didn't want it spread around, in case things fell through.

Now that I thought about it, I remembered Amos had earned a master's in electrical engineering before switching to psychology. *How far had he gotten?*

Gordy didn't know. He was planning to try to find out when he went up there.

I pondered. *Calvin, I'd still like to go to Eureka tonight.*

Okay. I'll try to work things out with Gordy. If not, you two'll be in contact range within a few hours and can hash it over between yourselves.

Thanks. One other thing. I hesitated. *Nelson told me he was in Baja when Amos died. Is that true?*

Calvin was silent for a moment, and I could sense his surprise. Accusing another telepath, even implicitly, of lying was serious business. *As a matter of fact, I don't know. Nelson is a bit of a maverick sometimes, and I'm pretty sure he occasionally takes his Comanche out for a short spin without telling anyone. I think he resents having his movements watched so closely, especially when he doesn't think it necessary.*

I grunted. That was just great. *Maybe I should give him personal notice that I'm heading to Eureka. I'll talk to you later, Calvin. Thanks for your help.*

Sure. Good hunting.

For a moment I just lay there, thinking. Then I rolled over, snared the phone, and placed a call to the airport.

I got into Eureka at eight that evening and rented a car for the drive out to Amos's home. I'd never been there before, but Gordy had given me detailed directions earlier in the day and I found the unpretentious little ranch house without difficulty. Mrs. Lederman, Amos's long-time housekeeper, was waiting there for me; with typical foresight, Calvin had phoned to tell her I was coming.

"I'm pleased to meet you, Mr. Ravenhall," she said when I had identified myself. "Please excuse the mess; I haven't felt much like cleaning today."

"It looks fine," I assured her. Her plump, middle-aged face had lost most of the signs of recent crying; the scars in her psyche would take much longer to heal. I didn't intend to pry, but the texture of her surface thoughts made it obvious that she had loved Amos deeply. I wondered how he had felt about her, and the thought inevitably turned my mind toward Colleen. . . . Wrenching hard, I forced myself back to business. "Mrs. Lederman, did Amos say or do anything unusual before he left? Anything that might imply he was worried or suspicious about something?"

She shook her head. "I've been thinking about it ever since Mr. Wolfe called from Colorado this afternoon and I can't come up with anything. Amos seemed a bit preoccupied when he returned from Los Angeles about two weeks ago, but that cleared up quickly

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and he went back to work on his telepath finder—I expect you've heard of that by now."

"Yes. Who besides you knew he was working on it?"

"Gordy Sears, of course," she said. "I think he was Amos's closest friend. And I believe Mr. Follstadt knew about it, too."

"Nelson?" That made sense, I suppose. One main use of the gadget would probably be to locate young telepaths before any accidental psychic damage occurred, and knowing such a thing was in the works might ease any fears Nelson had about being hurt like that again. "Would you let me see where Amos worked?"

"If you'd like," she shrugged, and I caught something about a mountain retreat from her mind. "But most of his electronics work was done at his cabin in the Sierras. It was more peaceful there, he used to tell me; nobody else *thinking* nearby."

She led me down the hall to Amos's workroom, and I poked around there for a few minutes without finding anything interesting. "Can you tell me how to get to his cabin?"

"Well . . . it was sort of private, but I guess it'd be okay now. But it'd take five or six hours to get there. You ever driven mountains at night?"

"Enough to know I don't want to try it in an unfamiliar area. I'll head out in the morning. If you'll give me those directions, I'll go now and get out of your way."

"No need for that," she shook her head. "I've made up the guest room for you."

"Oh. Thanks very much, but I don't think I ought to stay."

"It's no trouble. I'm leaving in a few minutes, anyway, and you'll have the place to yourself. Amos was always hospitable, Mr. Ravenhall," she added, as I opened my mouth to refuse again. "I know he would have wanted you to stay here."

What could I say to that?

She gave me a quick guided tour of the premises to show me where everything was, and then left, locking the front door behind her. I watched her car disappear down the road and then, moved by an obscure impulse, returned to Amos's workroom.

Off in one corner of the room was a small writing desk almost buried under neat piles of paper and correspondence. I'd ignored it the last time I came though, but now I went over and gazed down at it. A proper investigation should include a search of Amos's papers . . . but I had no right to pry like that. Besides, if I found something significant, would I even know it? I still didn't really know what I was looking for. Resolutely, I started to turn away . . . and as I did, the return address on one of the envelopes caught my eye. It was that of a Las Vegas casino.

Frowning, I picked up the letter. It was unopened, postmarked the day before Amos's death. Feeling guilty, I opened it.

The message was very brief:

Dear Mr. Potter,

Thank you for your note of the 4th. We are quite interested in your proposal, and would very much like to discuss it in person with you. Please let us know when it would be

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convenient for us to fly you down for a meeting.

It was signed by one of the biggest names in Las Vegas.

I reread the letter twice without making any more sense of it. What was Amos doing getting mixed up with Vegas casino owners? What kind of offer was he making? And was it pure coincidence that Amos had subsequently died in that very city?

Some of those questions might be answered if I could find the carbon of Amos's original letter, but a two-hour search convinced me that it wasn't anywhere in the house. Unless Amos had destroyed it or Mrs. Lederman had taken it away, there was only one other place it was likely to be. More than ever, now, I wanted to get to Amos's mountain retreat.

I was rudely awakened from a restless dream by an insistent knocking at the base of my mind, and it took me a second to realize that I was being contacted. *Yes?*

It was Gordy. *Dale, are you all right?*

Sure. I sneaked a look at my watch. Four thirty, and I was lying fully clothed on Amos's guest room bed. *Why do you ask?*

When you hadn't checked in by midnight Calvin and I started getting worried. We thought something might have happened to you.

Just fatigue, I assured him. *I'm sorry, though; I* had *intended to contact you last night. I guess I was more bushed than I thought. Listen, I may have something interesting here. Did you know Amos had a cabin in the Sierras?*

Yes, but I don't know where it is.

I do. I repeated the location Mrs. Lederman had given me. *I understand he did most of the work on his telepath finder up there; I'm going to go see how far he got with the gadget. And to check on something unexpected that's just cropped up.* I described the contents of the letter I'd found.

What do you think it means? a new voice asked.

I jumped. *Calvin? Damn, but you startled me—I didn't know you were listening in. Come to think of it, how come you're within range?*

Because I'm in Salt Lake City, he explained. *I flew here last night to give Gordy a hand in raising you. Now, what about this letter?*

I haven't the foggiest. But I think it might be important.

Maybe, Gordy said cautiously. *I gather you'd like me to stay here in Vegas until you're finished with everything?*

If you would. I think it would make things simpler if I didn't have to keep track of where you were going to be. Another day or two at the most.

Okay. Nelson will calm down eventually, I suppose.

How's that?

You didn't know? No, I guess not. He was going to fly up to Eureka after I left to attend Amos's funeral. He was furious that we were delaying things so that you could go running around robbing Amos of his last shred of dignity.

That last was a direct quote, Calvin added.

I winced. *Yeah. I'm sorry. But I still think it's got to be done.*

We're not blaming you, Dale, Calvin said. *Just finish up as quickly as pos-*

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sible, okay?

Will do, I promised. *Look, I'd better let you two go. I'll contact you when I get to the cabin. Honest.*

Gordy chuckled. *Okay. See you.*

I stared out the window at the predawn darkness for a full minute. Further sleep would be impossible; something in the back of my mind was urging speed. Swinging my legs over the edge of the bed, I located my shoes and headed to the kitchen for a fast breakfast.

Half an hour later I was driving towards the rising sun.

I'd half-expected Amos's cabin to be some rude shack on the side of a mountain, and was therefore vaguely surprised to find a quite modern-looking structure, complete with phone and power lines snaking their way down the mountain. With the key Mrs. Lederman had left me, I let myself in. The interior was as modern as the Eureka house, but not nearly as tidy; Mrs. Lederman probably didn't get up here very often. It was basically a single room, efficiency style, almost a third of which was taken up by a long work table holding about a ton of electronic equipment. In the center of the work table was Amos's telepath finder.

There was no doubt as to what it was. Clearly homemade, it consisted of a metal box the size of a portable tape player with a pivoting direction pointer protected by a plastic dome mounted on top. There were only two switches: on/off and general/tare. *Calvin? Gordy? Anyone home?*

Right here, Calvin answered. *Where are you, Dale?*

At Amos's cabin. I've found the telepath finder.

You made good time, Gordy grunted, sleep-cobwebs still evident in his mind. I'd forgotten they'd been up much of the night trying to contact me. *What's it look like?*

I described it for them. *That's it?* Calvin asked. *No range meter or anything like that?*

Nope. Maybe Amos planned to work on one next. Of course, you could always get range by triangulation.

Right. Have you tried it yet?

No. I wanted you two here when I did. Any ideas what this general/tare thing is?

There was a pause. *A tare is a deduction of the container's weight when weighing something,* Gordy said. *Maybe that eliminates the operator's effect.*

That makes sense, I agreed. *Okay, brace yourselves. Here goes.*

With the second switch set at "general" I reached out and flipped the device on. Instantly, the needle on top swiveled around and came to a stop pointing at my belt buckle. I took a couple of steps to the right; the needle followed me. *Seems to work,* I told the others. *Now I'll try it on "tare."* I flipped the second switch and waited.

Nothing. The needle moved a fraction toward the west, but was still pointing at me when it stopped. I flipped the switch back and forth a couple of times, but the needle refused to move farther than a few degrees. *This part isn't working.*

You sure? Gordy asked.

Yeah. I'm standing on the finder's north side, so if it edits me out it should swing around to point south-east, where

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you two and Nelson are. It certainly shouldn't point north by west. I turned it off. *We can worry about this later. I'm going to see if I can find that carbon.*

One corner of the work table was piled with papers. Leafing through the whole stack would take only minutes; as it happened, my search was considerably shorter. *I've found it.*

Read it to us, Calvin said.

I skipped Amos' identification of himself and his list of credentials. The interesting part was in the second paragraph:

> It has recently come to my attention that one of our group has been making periodic visits to your area for the purpose of "gambling"—I use quotation marks because, for him, certain games will not be governed by chance. No names need be mentioned; I do not intend to aid you in catching or prosecuting him, but merely want this unfair practice to stop. My efforts to dissuade him have failed, so as a last resort I am offering you a deterrent in the form of a telepath finder. . . .

Gambling? Gordy seemed shocked. *Who of us would do something like that? That's just crazy.*

I think we all came up with the same name simultaneously. Calvin was the first to admit it. *If Amos was right, there's only one of us who has really convenient access to Vegas, who can sneak in and out without too much risk of close-approach problems.*

I sighed. *You mean Nelson?*

DAMN YOU ALL! WHY CAN'T ANY OF YOU MIND YOUR OWN BUSINESS?

All three of us jumped violently. It was Nelson's voice, but so convulsed with fury as to make it almost unrecognizable. *Hey, Nelson, take it easy,* I said. *We didn't know you were listening in.*

Of course not. You'd much rather plot my destruction in private, wouldn't you? You and that holier-than-thou Amos. Well, I warned him!

Something was wrong here. Even given Nelson's strong emotion, his contact shouldn't be this strong. *Nelson, where are you?* I asked carefully.

You! he all but spat. *It's your fault. You couldn't let Amos die in peace. You couldn't let well enough alone. Now you're going to get what he got.*

Damn you, Nelson! Gordy suddenly interjected. *You killed him, didn't you? Amos caught you sneaking into Vegas, so you conditioned those thugs to hijack the plane and kill him!*

It was his own fault, Nelson shot back. *It was none of his damn business how I make my money. I* had *to do it—can't you see that?*

He'd gone from angry to pleading in the space of a single sentence, and I didn't like it a bit. Was he starting to crack up?

You'd like that, wouldn't you? Well, if I go, you're going with me!

And that shook me clear down to my toes. It had come up so quickly and so unexpectedly that I hadn't noticed: Nelson and I were in close-approach contact.

Nelson was only a hundred miles away!

And getting closer, he mocked me. *I know where you are, too; I listened to you give the directions to your pals*

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this morning. I'll be overhead before you know it.

Nelson, are you nuts? Gordy cut in. *You'll kill both of you.*

And why not? You're all out to destroy me anyway. I might as well take one of you with me. I've got nothing to lose now.

Dale, get out of there, Calvin ordered. *You've got to try and get away from him.*

I took three steps toward the door and froze. *Get away* where? *I don't know what direction he's coming from!*

Nelson laughed. His thoughts were getting progressively louder, and it was becoming harder and harder to hear Gordy and Calvin over the noise. Calvin had to virtually shout his next message. *Use the telepath finder. Maybe it really is working.*

I sprang over to the table, snatched up the box, and flipped the switch. In "tare" mode it once again pointed north by west—and stayed there even when I moved out of the way. Instead of coming straight up from San Diego, Nelson had circled around and was bearing down on me from the north. Clutching the box like a talisman, I ran outside to the car.

And then the nightmare began.

There was no way I could outrun Nelson, and we both knew it. His Piper Comanche had a cruising speed of at least a hundred eighty miles an hour and could travel in a straight line, while I had to stay on winding mountain roads at a quarter of his speed. If I could have gone at right angles to his path, let him overshoot me, I might have had a chance. But it was already too late for that sort of trick. Nelson had complete access to my surface thoughts, and there was no way for me to make any plans without his knowledge.

You see? It's useless to struggle. Give up; it'll be easier on both of us.

I gritted my teeth and drove on, trying in vain to shut out the increasing pressure slowly crushing my mind. A curve came up, too fast. I tapped on the brake, managed to negotiate the turn without losing too much speed. Every fiber of my being was screaming for me to get away, but I had no intention of driving off a cliff for Nelson's convenience. Wiping my palms, one at a time, on my pants, I tried to think.

I was completely cut off from Calvin and Gordy now—the close approach had been blocking any other contact practically from the minute I left the cabin. They would know enough to call the police, of course, but there was little chance the cops could help me. It would be less than an hour before Nelson closed to the twenty-mile gap that would ensure mental disintegration for both of us. The Air Force? They could act swiftly, but they'd first have to be persuaded to get involved. And in a completely non-military situation like this, the chances of that were essentially zero.

A reddish haze, more felt than seen, was growing at the edge of my mind. *Nelson, why are you doing this to us? It can't gain you anything.*

You've all worked against me: you, Amos, Calvin—everybody. You've robbed me of the money and power I could have had—that I deserved. *But at least I command my own death. And before that I'm going to make you fear me. You* are *afraid, aren't you, Dale?*

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He knew I was. For himself, Nelson felt no fear: only pain, anger, and morbid satisfaction. His death wish wrapped around me, tinging the reddish haze with black. Blinking back tears of agony, I kept going.

I don't know how long I drove, or how many close calls I had with the many cliffs I passed. Indeed, I hardly even noticed the road any more; I drove by sheer reflex. As inexorably as the tide, Nelson's mind slowly washed over mine. Our thoughts, memories, and emotions intertwined, becoming bent and altered by the force of the collision. I saw his decision to kill Amos, and his conditioning of an airline attendant and three drifters to set up and execute the hijacking. I watched the agony of Amos's death, and knew that he'd realized, too late, what was happening. Nelson's current plan was laid bare; how he'd tried to beat me to the cabin and destroy both the telepath finder and the evidence of his gambling. I felt his lust for power, his anger and frustration—at himself, me, the world—his self-doubts . . . and all this was becoming part of me. I was slowly being lost in this thing, this Dale/Nelson creature which was being created; and the knowledge that Nelson was similarly being swallowed up only added to my terror.

And all too soon, I saw the end approaching.

I mean that literally, for in a very real sense whatever there was that was still Dale Ravenhall was now occupying two separate bodies. I could actually see both the road ahead of me and the more majestic view from Nelson's Comanche. I could feel the plane's vibration, touch two different steering wheels . . . and I knew the agony would soon be over.

Yes, soon we'll be dead. Was that my thought or Nelson's? Not that the distinction mattered much any more. I paused for a moment to look through Nelson's eyes, to gaze at the mountains I would never see again . . . and, suddenly, a sharp left-hand curve around a cliff loomed ahead.

I gasped, and Nelson's death wish within me fragmented as a surge of survival instinct snapped a portion of my mind out of the growing chaos. Stomping hard on the brake, I wrenched the wheel hard to the left; and as the squeal of tires filled my ears, I saw I had overcorrected. The side of the mountain rushed at me, and I leaned back, bracing for the crash.

The world exploded with a ghastly crash and everything went black.

I woke up slowly, painfully, and with a sense of complete disorientation; but what I noticed first was the silence. It was just me again, Dale Ravenhall, and the other presence was gone. Was I dead?

He's awake.

I cringed involuntarily as the thought touched my mind. The other knew it immediately and hastened to reassure me. *It's all right, Dale, it's all right. It's just me, Colleen. You remember me?*

I swallowed hard and, timidly, reached out. *Is that really you, Colleen?*

It's really me. And Gordon and Calvin are here, too, if you feel like talking to them.

How're you feeling? Gordy asked.

Better, I answered. I was starting to

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wake up now, and memories were coming back. *Where am I?*

Sacramento, Calvin told me. *They airlifted you there after you crashed your car. You were pretty lucky; minor injuries only.*

Yeah. I was dreading the next question, but I had to ask it. *What happened back there? How did I escape?*

Nelson crashed. Went into a dive somehow and ran smack into a mountain. The experts think he must have turned and come down too fast; there's no evidence of mechanical failure.

I nodded within myself. In those last seconds I'd been in the Comanche's cockpit as well as in my own car—and in the latter I'd turned left, hit the leftmost pedal, and pushed on the wheel. Apparently, I'd done the same in the plane. But I couldn't tell the others what had happened. Not yet.

Calvin was speaking again. *You've been under sedation for the last three days while a handful of top psychiatrists did some tests. They say you've got all the symptoms of dissociative hysteria, but that you have a good chance of recovering with proper care and some hard work.*

Unbidden, tears formed in my eyes, and I clenched my teeth to keep them back. *Maybe. But who's going to come out of this recovery? Dale Ravenhall? Or a Dale/Nelson mixture?*

There was a pause. *We don't know, exactly,* Colleen said gently. *But whatever changes have been forced on you, you're still Dale Ravenhall. Hang onto that thought, that reality. You're still our friend, and we'll stick by you and give you all the help we can.*

Even if I turn out to be partly Nelson?

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We would have done the same for Nelson, Calvin said. *He was one of us, too. Try not to hate him, Dale.*

I don't hate him for me. But I won't soon forgive him for killing Amos the same way he tried to kill me.

What do you mean, the same way?

I sighed. I wanted so badly to just forget all this. But they had a right to know. *Nelson wasn't in Baja when Amos was killed. He was in Las Vegas.*

But that's where his conditioned hijackers took the plane. Colleen sounded confused.

Which is exactly what he wanted. Don't you see? Picture Amos rushing helplessly toward a fatal contact with Nelson, who is pretending he is there just by chance. You all know how noble and selfless Amos was. What would he do in that situation?

There was a long pause, the texture of which changed from puzzled to horrified to very sad. *He would have committed suicide rather than let them both die,* Calvin said at last. *That's what happened, isn't it?*

I nodded wearily, and Colleen must have sensed my fatigue. *I think we'd better go now and let Dale get some rest,* she said. *Dale, we'll be here as long as you are, so just call whenever you want to talk. Okay?*

Sure. Thank you—all of you.

Take care, Dale. We'll talk to you later.

I turned my head to the side against my pillow. Sleep was pulling at me, and I welcomed the temporary oblivion it would bring. *I am Dale Ravenhall,* I said to myself and to the universe around me. *You hear me? I am Dale Ravenhall. I am Dale Ravenhall. . . .*

I was saying it right up to the moment I fell asleep. Down deep, I knew it wasn't completely true. ■

● *David Brin is a relative newcomer, but one worth watching; you may remember the highly favorable review of his novel* Sundiver *in these pages some months back. His first Analog appearance is in this issue, and next month he has the cover for "The Tides of Kithrup," a novelette set in the same universe as* Sundiver. *Every intelligent species, it seems, got that way with the aid of a "patron" race—except man, for whom no patron has been identified, and who has recently been doing some patron-like things himself, to the benefit of dolphins and chimps. In "The Tides of Kithrup," a mixed party of terrestrial origin is marooned on a fascinating world, very wet and very dangerous, and has the urgent problems of saving itself and getting back in touch with off-planet allies. But they have a lot more to worry about than their own rescue. . .*

The fact article is "The New Neutrinos," wherein Richard Matzner and Tony Rothman explore some recent developments concerning these extremely elusive, massless particles—or are they massless? If not, the implications may be a lot farther-reaching than you'd think.

And Dean Mclaughlin's Dawn *continues, as the reluctant prophet Isak learns that some people don't want to know the truth—and others will find their own uses for it.*

IN TIMES TO COME

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The solutions to some problems are relatively straightforward and require only enough determination and effort. Others, obviously are intrinsically too big and complicated. Obviously....

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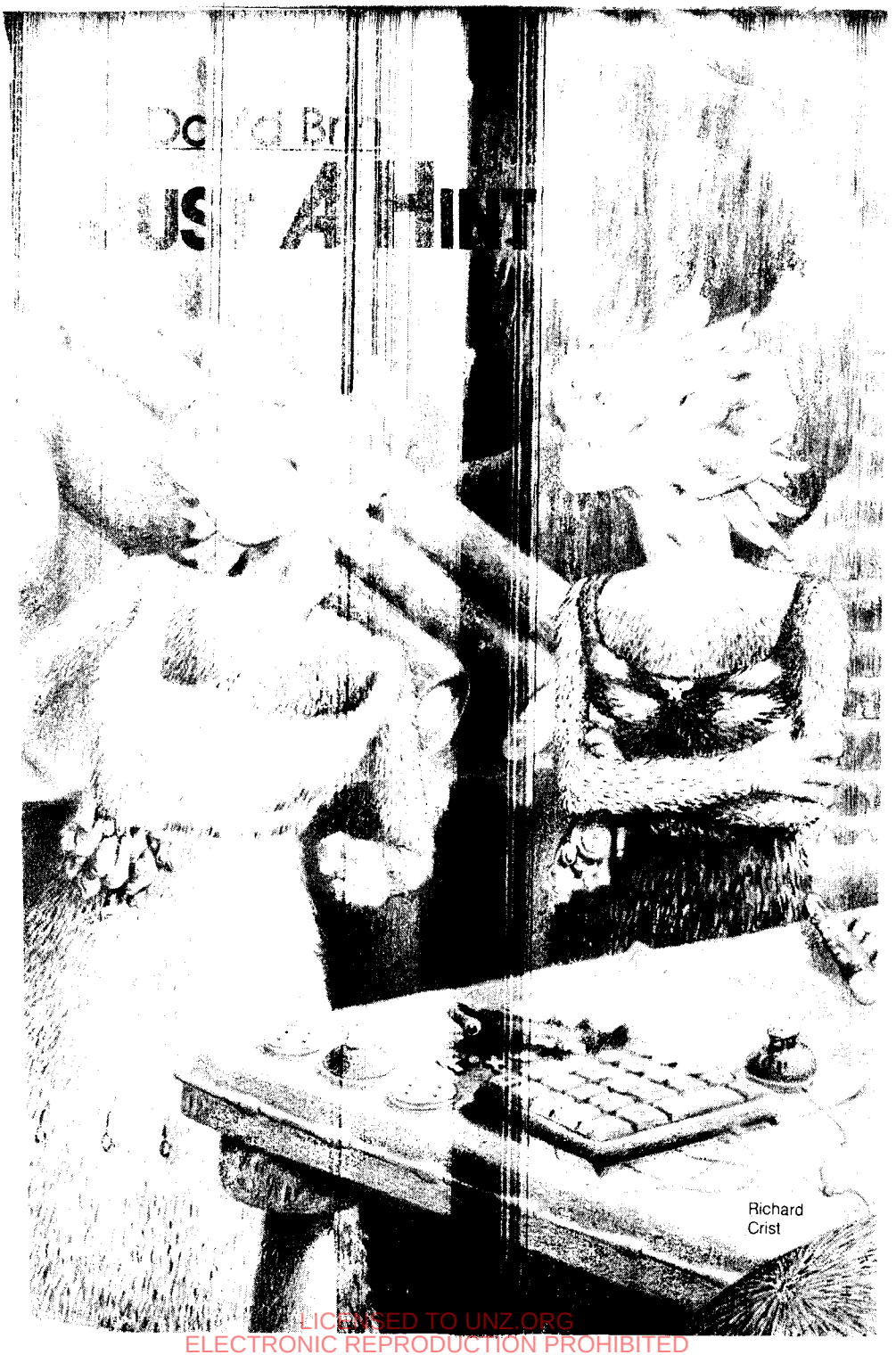

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It was exactly seven A.M. when Federman finished typing the last data entry. The small console flashed a confirmation and, several miles away, the central processor began correlating the results of the previous evening's observation run.

Federman sighed with relief as he pushed away from the desk, but winced as he stretched back in the swivel chair, his spine crackling. Age seemed to make every strain and tiny pop a cruel reminder, as if decay were audibly calling out its territoriality as it slowly took possession.

The classical music station playing on his desktop radio began an update of the morning's headlines.

The weather would be beautiful over most of the country. The chance of rain in the nearby area was less than 20 percent. The current probability estimate for the likelihood of nuclear war still hovered around 30 percent.

Liz Browning backed in, pushing the door open with one foot as she balanced a cardboard tray with coffee, doughnuts, and the morning newspaper.

"Good!" she said with satisfaction as she laid her load down on his desk. "I knew you could finish without me. I don't know how you manage to stay up all night reducing data without getting hungry. I just had to get some food!"

As a matter of fact, Federman had started noticing a growling emptiness in his stomach almost the moment the last figure had been typed. If his graduate student had been glad to let him finish the marathon session alone, he was just as happy she had brought back the goodies. Thank goodness the one thing that hadn't let him down was the constitution to be able to enjoy coffee and donuts at seven A.M.

"It's all pure love, Liz. Anyone who stays up all night has to be in love . . . in this case with astronomy. Either that or he's crazy or in the army."

Elizabeth Browning looked more mature than some of his research assistants. She grinned ironically, leaving crinkled smile-lines around the eyes. Her straight brown hair was braided behind her back.

"Or it means he wants to beat Tidbinbilla into print on that new pulsar analysis. Come on, Sam. Outside it's already a beautiful day. Let's let some light in here."

She went to the window and pulled the heavy drapes aside. A bolt of brilliant sunshine came crackling in. She didn't even wince as she leaned forward to open the window, but Federman brought up a hand to cover his eyes.

"Cruel youth," he moaned. "To bring these spotted hands and time-wracked limbs out under the searching gaze of day!"

She sighed.

"Aw, come on, Sam. You and I both know there's no such quotation. Why do you keep making up fake Shakespeare?"

"Perhaps I'm a poet at heart?"

"You're a scoundrel and a rogue at heart. That's why I'm so incredibly pleased with myself for latching onto you as a research advisor. Everybody else may be losing their grants as the military budget increases, but you know how to finagle enough funding to keep the radio astronomy program here going. My biggest hope is that I can learn your

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techniques."

"You'll never learn them as long as you fail to understand why I make up Bard-isms." Federman smiled.

Liz pointed a finger at him, then thought better of it.

"Touché," she said. "I'll enroll in Lit. 106 next term. Okay? That is, if there's still a world, next term."

"Are we in a pessimistic mood today?"

Liz shrugged. "I shouldn't be, I suppose. Every spring it seems there's less smog and other pollution. Remember that eyesore wrecking yard on Highway 8? Well, it's gone now. They've put in a park."

"So nu? Then what's wrong?"

She threw the morning paper over to his side of the desk. "*That's* what's wrong! Just when we seem about to make peace with nature, they're stepping along the edge of war! There were demonstrations on campus, yesterday . . . neither side listening to the other, and neither side willing to concede a single point. I tell you, Sam, it's all I can do to keep from hiding in my work and letting the world just go to hell on its own!"

Federman glanced at the paper, then looked up at his assistant. His expression was ironic.

"Liz, you know my feelings about this. Radio astronomy is not disconnected from the problems of war and peace on Earth. It may, indeed, be intimately involved in the solution."

The sophont had no nose, but he did have a name. If one started there and kept listing his attributes one would find him quite a bit more human than not. The things his race had in common with the dominant race of Earth would have surprised them both almost as much as the differences, but the most important of each has already been mentioned.

He had no nose. His name was Fetham.

"No!" he cried, in the language of confrontation. He pounded his four-fingered fist on his desktop for effect. "Are you mad? Mad! What do you mean, the funds are needed elsewhere? The Council and Legislature agreed by almost unanimous vote. Full, permanent funding! Full, permanent, emergency funding!"

The smaller being with no nose was named Gathu. He held up his hand in the newly discovered version of the Gesture of Placation Directed at the Optic Nerve.

"Please, Academician! Please remember that those votes were taken years ago. There is a new Assembly now. And since the public health situation has deteriorated . . . ."

" . . . the situation I'm trying to solve!"

" . . . it has fallen on the leadership to seek out new sources of finance for medical research. Surely you know that we applaud your efforts. But it has seemed more and more a shot in the dark."

Fetham's prehensile ears waved in agitation.

"Of *course* it's a shot in the dark! But isn't it worth it? There may be a race out there that has been through what we now face. With the entire world threatened, our very survival in question, shouldn't we make the effort

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to contact them?"

"Yes, very worthy, for a long shot," the government representative nodded. (Or performed the equivalent bodily statement for his species.) "But you have another two years in your appropriation, have you not? And by husbanding your funds you might make them last even longer."

"Idiots!" Fetham hissed. "Why, the first beamed message will reach my first target star only this year! It will take years for their reply to reach us, barring *any* delay in interpreting our message!

"Are *all* governments as stupid as ours?"

Gathu stiffened. His ridge crest waved in suppressed irritation.

"You may, of course, emigrate to any other nation you wish, Academician. The international Concords give you the right to establish yourself as a citizen of any system of government found under our sun.

"Shall I arrange to have the papers sent over? Perhaps you'll have better luck. . . . "

Gathu's voice trailed off, for Fetham had raised his hands in the Gesture of Supreme Disgust and fled the room.

"You know," Federman began, staring at the ceiling while he tilted back in his swivel chair. "You know, someone once told me that the definition of genius was the ability to suddenly see the obvious."

Liz Browning stopped pacing long enough to pick up her coffee cup from the stained newspaper on the desk. The latter was open to a page of bold-faced headlines and photos of armed men.

"Do you mean that the answer may be just staring us in the face? Are you saying we're stupid?"

"Not stupid. Obstinate, perhaps. We hold onto our basic assumptions tenaciously, even when they are about to kill us. It's the way human beings work.

"For instance, did you know that for years Europeans thought tomatoes were poisonous? No one bothered to test the assumption.

"Even the most daring and open of us can't question an assumption until he becomes *aware* of it! When everyone accepts a paradigm it never becomes a topic of conversation. There must be thousands, *millions* of things like that, which men never even notice because they don't stand out from the background."

Liz shook her head.

"You don't have to belabor the point. Every sophomore has thought about that at one time or another. And it's certainly happened that some genius has leapt out of the bathtub, screaming 'Eureka!' and telling everybody of the new way to do things."

She tapped the newspaper.

"But this isn't as easy as that. Our problem of world survival is made up of several hundred million tiny problems, each with all of the complexity of a living person. There's no underlying simplicity to war and politics, much as Marxists and others dream of finding one. They only make matters worse with simplistic claims and pseudologic."

Federman sat up straight and rested both palms on the desk. He looked at Liz, seriously.

"The idea is that we may have missed something *basic*."

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He stood up quickly, and instantly regretted it as his heart pounded to make up for the shift in blood pressure. For a moment, the room lost its focus.

Deliberately, to keep Liz from becoming concerned, he picked his way around the clutter of books and charts on the floor around his desk and rested his shoulder against the window frame until his equilibrium returned.

Brisk, cool, spring morning air flooded in, carrying away all traces of the stale odors of the night. The sweet, heavy smell of new-mown grass drifted in.

On its way to him the breeze toyed with the branches of aspen and oak trees farther down the hillside, toward the waving wheatfields in the valley several miles away. A low pride of cumulus drifted overhead, cleanly white.

In the distance he could see a gleaming Rapitrans pull into the station at the local industrial park. Tiny specks that were commuters wandered away from the train and slowly dispersed into the decorously concealed factories that blended into the hills and greenery.

It was, indeed, a beautiful day.

Birds were singing. A pair flew right past his window. He followed them with his eyes until he saw that they were building a nest in the skeleton of what was to have been the new, hundred-meter radio telescope.

There was a rumbling in the sky. Above the high bank of clouds a formation of military transports made a brief glint of martial migration. The faint growling of their passage had become an almost daily occurrence.

Federman turned away from the window. Inside, except where the brilliant shaft of light fell, there appeared to be only dimness. He spoke in the general direction of his friend and student.

"I was only thinking that maybe we've been missing the forest for the trees. It might be something so simple . . . something another culture with a different perspective might. . . . "

"Might what, Sam?" Liz's voice had an edge to it. "If there ever *were* peaceful cultures on Earth, they didn't have the other half of the solution—a way to keep from getting clobbered by the other guy who *isn't* peaceful! If they did have that answer, too, where are they now?

"Look at the world! Western, Asian, African, it makes no difference which culture you look at. They're all arming as fast as they can. Brushfire wars break out everywhere, and every month the Big Blow doesn't happen makes worse the day when it does!"

Federman shrugged and turned to look out the window again.

"Maybe you're right. I suppose I'm just wishing for a *deus ex machina*." His eyes lovingly coveted the abandoned, unfinished dish outside.

"Still, we've done so well otherwise," he went on. "The simple problems with obvious answers are all being solved. Look at how well we've managed to clean up the environment, since people found out about the cancer-causing effects of pollution in the seventies and eighties. Sure, there was inertia. But once the solution became obvious we went ahead and did the logical thing to save our lives.

"I can't escape the feeling, though, that there's a similar breakthrough to be made in the field of human conflict . . . that there's some *obvious* way to

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assure freedom and dignity and diversity of viewpoint without going to war. Sometimes I think it's just sitting there, waiting to be discovered, if only we had just a hint."

Liz was silent for a moment. When she spoke again it was from the other edge of the window. She too was looking out at the spring morning, and the armed convoy in the sky.

"Yes," she said softly. "It would be nice. But to be serious, Sam, do you really think you could get any more funding than you've already got, to do your spare-time search for radio messages from space? And even if you were successful, do you think the Big Blow would wait long enough for us to decipher a message, then send one of our *own,* and eventually ask complex questions on sociology?"

She shook her head.

"And do you honestly think they'll be similar enough to us to understand what we'd be asking? Do you really think we're missing something so fundamentally simple that just a hint over the light years would make that much difference?"

Federman shrugged. He didn't take his eyes from the skeleton in the yard.

The scientist with no nose looked out over his city. For a long time he had fretted and fumed beneath the great dish antenna; then he had gone for a walk around the edge of the research center compound.

Years ago these hills had been suburbs. Now factories belched smoke into the air on all sides. The sight cheered him slightly. He could never look at such an obvious sign of progress and prosperity for long and stay in a black mood.

There were so many other things to be proud of, too.

After the invention of atomic weapons, before he was born, his parents' generation had finally found the motivation to do the obvious and abolish war. The method had been there all along, but no one had been sufficiently motivated before. Now the fruits of peace were multiplying throughout the world.

Two automobiles for everyone! Fast, efficient stratospheric transport! Quick-foods easily dispensed from fluorocarbon-driven aerosol cans! The licentious luxury of lead-lined dinnerware!

All of this was good. Peace and prosperity.

But the Plague had soon come among them.

It had come soon after the last war, and now affected almost everyone. Lung ailments, skin cancer . . . that horrible sickness that struck the mercury and bismuth mines . . . the death of the fisheries.

Huge sums were spent to find the microorganisms responsible for this rash of diseases. Some were found, but no germs yet that could account for such a wide range of calamities! Some scientists were now suggesting a bug smaller than a virus.

Fetham looked up. Gathu, the government representative, had followed him outside.

"I am sorry I shouted," Fetham said slowly. The other being-with-no-nose did the equivalent, for his species, of a forgiving nod. Fetham gave a hand-turn of thanks.

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"It's just that I was hoping the Others might know something . . . something that would help us understand."

Gathu was sympathetic.

"I know, Academician. But honestly, what could they tell us about *our* problems—especially biological problems—even if you did succeed in making contact?

"If they exist at all, they live on a completely different world, with totally different body chemistry. How could they give us knowledge that would help us defeat this Plague?"

Fethan performed a gesture that conveyed the meaning of a shrug. His large and very subtle ears filtered out the brash, everpresent noise of traffic, yet allowed him to hear the whistling of the wind through the silted, murky sky.

Suddenly he had a totally irrelevant thought.

I wonder where the birds are? They used to be all over this part of the city. I never noticed that they had gone, until now.

"I suppose," he sighed. "I suppose I was hoping for just a hint. . . . " ■

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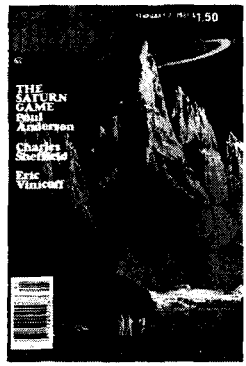

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THE REFERENCE LIBRARY

By Tom Easton

The Sinful Ones, Fritz Leiber, Pocket Books, $1.95, 176 pp.
The World Fantasy Awards, Vol. 2, Stuart David Schiff and Fritz Leiber, eds., Doubleday, $10.95, 248 pp.
Beyond Rejection, Justin Leiber, Ballantine, $2.25, 177 pp.
Valis, Philip K. Dick, Bantam, $2.25, 240 pp.
Microcosmic Tales, Isaac Asimov, Martin Harry Greenberg, and Joseph D. Olander, eds., Taplinger, $12.95, 325 pp.
The Nitrogen Fix, Hal Clement, Ace, $6.95, 289 pp.
The Dreamers, James Gunn, Simon and Schuster, $10.95, 224 pp.
Thorn, Fred Saberhagen, Ace, $2.75, 347 pp.
Re-Entry, Paul Preuss, Bantam, $2.25, no pages.
Wheelworld, Harry Harrison, Bantam, $1.95 192 pages.

A recurrent question in this business is the line between science fiction and fantasy. The two subgenres blur at their borders, where it becomes hard to see just what the key to distinguishing definitions should be. This key cannot be science, future, rationality, or even consistency, for fantasy can depend on these as much as SF. Asked to draw the line between the two, many people say fantasy deals with the supernatural —magic, fairies, ghosts, and demons—and SF with the merely natural. The fantasist finds the rules for his fictional worlds among those rules *known* not to apply to the real world.

Yet sometimes the fantasist does this in a definition-defying way. He chooses inapplicable rules, but he chooses ones that many people think or have thought *might* apply (without appealing to the supernatural). Instead of asking a scientific or technological "What if . . . ?" or "If this goes on . . . " he asks a philosophical or theological one. And doing this, he throws the definition up for grabs. After all, scientists receive Ph.D., or "Doctor of Philosophy," degrees. Scientists are recognized as philosophers. (So are humanists, but let's shunt them aside for convenience, for now. Theologians get D.D., or "Doctor of Divinity," degrees and are not recognized or labeled as philosophers, though they may in fact have more in common than scientists with philosophers.) Can we invert that to say philosophers—some, at least—are also scientists?

Most folks will give me a flat "NO!" to that. But I suspect a better, more reasoned answer would be, "Well, sort of," since though philosophers stay out of the lab and workshop, they do use many of the same methods of thought and have many of the same concerns. And that is enough to allow the claim that some fantasies are really a kind of science fiction. For instance—Pocket Books has just reissued Fritz Leiber's **The Sinful Ones.** I read it with a sense of having read it once before, long ago (it first came out in 1950, when I was six years old, so it couldn't have been

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that far back). I enjoyed it, and it prompted the thoughts with which I began this column.

Some of you know the book. The rest of you don't, but perhaps I have intrigued you. So what's it all about? The tale is set in 1950 Chicago, a place and people not really so different from today's. Protagonist Carr Mckay is at his employment agency desk when a distraught young woman (Jane) enters, followed by a second woman who acts as if she is invisible. Carr soon realizes that other people in fact *do not* see either woman—or, for that matter, Carr himself, now that he has been "awakened." People act as if they have been programmed to perform set actions and utter set speeches whether they have anyone with whom to interact or not. Eventually, Carr realizes that:

> "*The universe was a machine*. The people in it, save for a very few, were mindless mechanisms, clockwork things of flesh and bone. So long as you made the proper clockwork motions, they seemed to react intelligently. But when you stopped, they went on just the same. When you quit being part of the clockwork, they ignored you." (pp. 122-123; italics in original)
>
> "What might some people do if they awakened to the knowledge that they alone had minds and consciousness, that they could do what they wanted and the machine could not stop them, that all authority was truly blind?" (p. 124)

Carr and Janè find themselves menaced by a crew of just such soulless villains. The novel is the tale of Carr's growing awareness, their running and dodging, and their final escape (no thanks to their own efforts, though). It's a good, provocative read, for it effectively chills as you come to believe that you cannot know who is real and who is not, who is alive and who is machine, who is awake and who is asleep. The people around you all *look* the same. Which ones are aware of you? Who just glanced your way? Who is threat, who ally, and who neutral furniture? And you—are you *sure* you're real? You think you've stepped outside the machine, but how can you know you weren't programmed to act and think that way?

It's solipsism of a sort. Solipsism tied in a knot. A fantasy based not in the supernatural, but in philosophy. Does that make it SF? Is the question even relevant? You decide, but be sure you don't miss the novel. You'll like it.

The Sinful Ones is hardly unique in Leiber's *opus*. He has written several borderline SF-fantasy stories, along with some fairly straight SF and the purer fantasy—*Conjure Wife*, the Fafhrd & the Grey Mouser stories, etc.—for which he is best known. Along the way, he has copped eight Hugos, three Nebulas, and two World Fantasy Awards. He is now and has been for what seems ages a writer of s*t*a*t*u*r*e. However, that stature is not recognized as widely as it should be. Leiber easily deserves the popular reputation enjoyed by Bradbury, King, and a few others. He hasn't got it, though, and I expect he won't get it within his lifetime. I wish there were a way to solve the problem.

A problem it is, too. What strange factor brings the public recognition that is fame and fortune? It cannot be skill alone, for Leiber may be a more skillful evoker of mood and place and character than Bradbury. Is it a willingness to embrace themes of the "Lincoln's doctor's dog" type? Bradbury did that in his heyday and broke into the slicks. Leiber has not.

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But enough of wondering and would-it-were. Leiber isn't as productive as he once was, but he does still produce. The latest is an anthology he has coedited with Stuart David Schiff (of *Whispers*): **The World Fantasy Awards: Volume Two.** The book includes the Award winners and many runners-up for 1975 and 1976. It has a preface by Schiff; an introduction by Leiber, Leiber's own "Belsen Express" and "Smoke Ghost;" Steve King's "Jerusalem's Lot," a precursor to *Salem's Lot;* Bradbury's "The October Game," a gruesome marital disaster; and pieces by Harlan Ellison, Avram Davidson, Manly Wade Wellman, Frank Belknap Long, and others. A particularly strong story is Russell Kirk's "There's a Long, Long Trail A-winding" (also available in Kirk's own collection, *The Princess of All Lands,* from Arkham House, 1979), an inverted ghost story. The book as a whole is well worth its price; if you wait for the inevitable paperback, you'll have a real bargain, even at today's prices.

If you've followed the biographical and autobiographical comments on and of Leiber that have appeared from time to time, you know he is the son of a Shakespearean actor. Fantasy seems singularly appropriate for a writer with such ancestry. So what of Leiber's own son, Justin? He is a member of the Philosophy Department at the University of Houston, where his concerns cover the mind-body problem, linguistics, psychology, extraterrestrial communication, and cats. Somehow that list also seems appropriate, especially since Justin Leiber has just written his first SF novel, **Beyond Rejection.** The story is mildly spoiled by a version of the old "And then I woke up" ending, but since it is the first volume of a trilogy, we can expect that to be remedied in some now-unpredictable way. The basic idea is not unfamiliar—personality and memory "tapes" can be transferred from body to body—but it is worked out in laudable detail. Host bodies are those of suicides, who submit to brain-wiping. They are scarce, but then the need—met with government funds—is relatively small, for medicine can cure most injuries and no mind more than 80 years old can legally or safely be transferred. Too, there is a rejection problem, for minds can be transferred only to carefully matched brains, whose synaptic patterns are not too unlike the original's. After transfer, there is an adjustment and training period when mind meshes with body and comes to terms with such residues of the body's original tenant as motor skills (stored in the cerebellum, not the cerebrum).

Such are the problems faced when Ismail Forth awakens in the body of a woman—one with a prehensile tail, yet. He is then informed that his original male, well-muscled, stately body has been stolen, presumably so that an over-80 mind can be illegally transferred into his youthful frame. And the hunt is on as Forth, companioned by Candy Darling, a 77-year-old in an 11-year-old body, heads for the scene of his supposed death, the undeveloped world of Rim. They take the *Pequod,* the same ship that carried Forth on his last voyage, and on it they find clues. On Rim, they find more, and finally they locate the villain himself, wearing Forth's own body.

In the end, as the book's title implies, Forth is past the point of potential rejection crisis. Mind and body are fully integrated, and he can even use that prehensile tail. Because of the ending, it is impossible to guess what might be in store in volumes two and three of the trilogy, but Justin Leiber is good enough

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to leave us more than willing to take a whack at them. Pay attention to this third-generation dramatist, folks. He's off to a good start and may even match or exceed his father in time.

Now look what I've just done! The curse of the son! Must every boy be doomed to this ambitious struggle? And does Justin really deserve a reviewer's snide implication that Papa may just be unsurpassable? Maybe not, but I dasn't say Justin has no hope *or* that Papa is sure to be surpassed. The first is hardly fair, and the second is no sure thing. Justin is just beginning his career as a fiction writer, after all, and though we watch him with interest, we must reserve our judgment until we see his pattern beginning to take shape. One data point does *not* make a graph. So let's leave it at that for now.

Valis, Philip K. Dick's latest, is billed as a "breakthrough book for Dick, one we expect to receive a lot of mainstream review attention. It's extremely autobiographical, neatly fudging the line between fiction and history. It has strong religious elements and a very personal feel to it." It is therefore interesting in at least one way. And "autobiographical" fiction invites the reader to try to untangle the autobiography from the fiction. The game may be a little easier to play with *Valis* because the story is, after all, SF. There are elements that can definitely be ruled out of Dick's own life. Of the remaining elements, we are left with drugs, split personality (*not* schizophrenia), loss of the women in his life by death and divorce, a deep obsession with gnostic theology, and illusions of divine revelation. How much is real? How much is fiction? You've heard as many rumors as I have, I'm sure, so I'll leave you to play the game alone.

The tale's protagonist is Horselover Fat, a Greco-German translation of Philip Dick. Trapped in other people's death trips, he is struck by an information-bearing beam of pink light. The beam sets off his gnostic obsession, and he gets the notion that we are all but cells in a colossal, mad Brain that both perceives and makes the world. Dick spends half the book developing this much of his story, and this much may be heavily autobiographical. The second half begins with a visit to a movie also called *Valis* which gibes with Fat's fantasies and sends him and his friends on a search for others who know the Truth. They find them; they find the promise of a Second Coming; and they find threat:

> "A common worry unified all of us, the fear that we knew or had figured out too much. We knew that apostolic Christians armed with stunningly sophisticated technology had broken through the space-time barrier into our world, and, with the aid of a vast information-processing instrument, had basically deflected human history. The species of creature which stumbles onto such knowledge may not show up too well on the longevity tables."

In the end, Fat and his friends see the end of the threat, but not of the even more threatening promise, and Fat himself has his head on more or less straight. Along the way, there is some action, but not enough to make *Valis* a truly dynamic novel. In fact, as a novel, *Valis* isn't that strong. It is much more of a head trip, playing games with philosophy and theology. As such, it reminds me of Robert Anton Wilson's books, though Dick lacks much of Wilson's verve (for all that Wilson trips so lightly through the head, he does manage vigorous, if zany, plots). It also re-

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minds in at least one offhand prediction for the future that could be taken to mean a Reagan victory next month (I write this in October 1980). So, if you like Dick, Wilson, or self-revealing novels, this may be one for you. If you prefer strong plotting in a more or less sensible vein, you will probably do best to avoid it.

Have we had too much philosophy so far? Then let's take a short break—or, better, a hundred breaks—with **Microcosmic Tales.** Asimov, Greenberg, and Olander have gathered a full ten tens of short short SF stories. Most of them are good, some are excellent, many are funny. However, they also reveal the greatest problem of the briefest tales—they don't have room for full development of the science, and the gaffes stand out far too clearly. For instance, Mack Reynolds's "Dead End" features a gent who wants to become a vampire, finds the sole remaining bloodsucker, implores him to bite, and is rejected with the plaint that "I'm allergic to all but Rh-Negative, the rarest blood type of all! You're type 'O.' If I bit you I'd break out in a million hives!" Bah! The error stands out so clearly I'm almost ashamed to say it, but—the ABO and Rh types are *not* mutually exclusive; one has a type component of each, along with 30-odd other components; and I am type O-Rh Negative myself!

I'd never run into this story before, probably with reason. It first appeared in 1957 in something called *Tales of the Frightened*, and it should have stayed there. However, the editors picked it. They also picked a few other dogs, but they picked many more miniature gems, reprints and originals, and I won't try to list them. Get the book and find them for yourself.

* * *

Hal Clement is widely considered our premier world designer and one of our finest writers of "hard science" SF. I've enjoyed his creations, but I've also wondered just how justified his reputation is. Now I feel it's overblown, for his latest, **Nitrogen Fix,** takes so many liberties with the science that I find it seriously flawed. If his other books, which I have not reread in years and whose science I only dimly recall, do as much, then he ain't what he's cracked up to be.

Clement's premise is intriguing. We are now on the verge of using genetic engineering to create microorganisms able to fix atmospheric nitrogen as ammonia and nitrate more freely than existing forms. He posits our success and goes on to say that since nitrate formation requires oxygen, the new creations remove the oxygen from our air as they multiply and evolve into numerous varieties, even into versions of plants. Humans survive in sealed environments, with oxygen provided by a few coddled surviving plants.

It's a great idea. It's original, monumental, downright breathtaking. *But* a metabolism based on extracting energy by reducing nitrates is so unfruitful that nothing larger or more vigorous than certain bacteria uses it today. I strongly doubt that even genetic engineering can change that, given the laws of chemistry. But Clement gets even more unlikely when he introduces an alien whose metabolism is also based on nitrate reduction, an alien who must need an order of magnitude more energy. I don't believe it, and neither will you if you know a smidgin of chemistry.

But let's set the disbelief aside for now. What about the story itself? It is a tale of conflict between urbanite and nomad, age and youth, conservative and innovator. The young, innovative no-

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mads are a man, a woman, and their child, accompanied by the alien Observer, Bones. They bring metal and glass to a city faction, also young, innovative, and committed to fundamental change, but also to the idea that the aliens are a threat and responsible for Earth's present hostility to humans. The city youths capture Bones. The nomads free him and enlist the city's conservative elders in the service of the status quo. But change is inevitable, not least because Bones is a student of worlds, all of which seem to evolve from a stage with an oxygen atmosphere and oxygen-based life to one like Earth's present. He wonders if the change is always due to sapient intervention. Can it be reversed? If so, what would an oxygen world, such as he and his kind have never seen, be like?

The conflict has no real winner, but there is a resolution of sorts, a truce of mutual understanding between the parties. In this way, the novel resembles reality more than much fiction. In the same way, it is a satisfying tale, a thoughtful, loving one, and this despite characters who are little more than postures. As always, Clement well illustrates the claim that SF is a literature of ideas and that it can stand firmly on that ground alone. Yet how much better would this book be if the ideas were not flawed? Would not Clement's strikingly holistic concern for sapience and context be that much more persuasive?

James Gunn's **The Dreamers** is a curious artifact from a strange future. The discovery of the chemical basis of memory (in peptides that can be injected to transfer memories—based largely on the flatworm work of McConnell and Thomson, considered misleading or downright wrong by most in the field) results in a world where a very few specialists generate knowledge. The dreamers turn this knowledge into dreams coded in memory peptides, and the many, many "poppets" consume the dreams as vicarious life. The species is confined to urban centers, clusters of towers managed by computers and overseen by a single Mnemonist through whose blood flows all information in a stream of peptides. In one such urban center the Mnemonist is old. He seeks a successor, and in his search he examines one of the specialists, a historian; one of the volunteers dedicated to supplying the few services the computers cannot; and a dreamer. As Gunn describes these lives, he brings his future culture alive in a uniquely effective way. He also criticizes those features of human nature—selfishness and self-indulgence—that doom his people to extinction as competence, altruism, dedication, and self-motivation fade and die. Is he justified? I think not. The psychologists agree too widely that once basic needs are tended to, need for achievement and self-actualization become common, widespread motives, not satisfiable vicariously. If they are right, even the perfect vicarious experience would not paralyze the species. Cynicism may be only rational, but Gunn is too cynical by far.

We'll end this column with three repeat performances, sequels to books I've reviewed before. First, we have Fred Saberhagen's **Thorn,** sequel to *An Old Friend of the Family* (see the January 1980 *Analog*). Once again we meet Vlad Tepes, vampire, now known as Jonathon Thorn. Interested in a Renaissance painting of his long-gone wife, he attends an auction, becomes embroiled with another of the *nouveau-morte*, strikes the trail of a woman who just might be his Helen, and with the

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aid of Judy Southerland and her grandmother (see *Friend*) resolves two ancient heartaches. The novel itself offers alternate stories: one present, one past, one strife now, one strife then, when Vlad was truly alive. Both revolve around the painting and the woman, and both add to our sense of Vlad as a rounded, human character, vampire or no. Saberhagen has apparently dedicated himself to removing the cloud of myth and legend that surrounds the reality, to showing us that our fears of the unknown are really groundless, that they disappear with knowledge. He succeeds, and I look forward to more about his unique version of Travis McGee, the hero vampire.

My only complaint about this book is that Ace seems to have hired Baronet's cover-blurb writer. The back cover reads: "A love affair for the ages? . . . Or a living horror that has loosed the bonds of time?" Wouldn't you prefer " . . . *slipped* the bonds of time"?

Repeat performance number two is Paul Preuss's **Re-Entry,** sequel to *Gates of Heaven* (see the September 1980 *Analog*). If *Gates* was coincidence-happy, which I called it then, *Re-Entry* is paradox-happy. Preuss's future is one in which Earth's authoritarianism has largely been left behind while the colony worlds made available by the double-black-hole transport miracle have gone their separate ways. One colony, once a food factory, is now an experiment in recreated evolution. Different sectors of the world are given over now to different eras of Earth's past; there are lands of dinosaurs, of titanotheres, and of mammoths; and in each live the "feral tribes," remnant peoples from the planet's agricultural past, and the wildlife-managing Rangers. Born to a Ranger family, Phil becomes a scientist of renown and unhappiness; in an effort to find happiness, he learns a way to use the double black holes to leap back in time. He does so, pursued by a security agent, and becomes his own childhood tutor. Yet he cannot hope to change his own life, for it seems that the black holes jump one into different universes, not just different places or times in the same universe. If simultaneity and causation retain any sense at all, it is only because there is an infinity of universes, even of similar universes; and as you jump from A to A', another you jumped from A'' to A.

It's a nifty concept, with the corollary that if you look closely you just may see differences in your friends before and after a jump. Preuss does a good job with it, too, a better one than he did with *Gates,* for his gods don't pop out of the machine so often. He has built his story far more strongly on its own implications, and if he can do as well again, we can welcome a growing star. His frame is certainly good for more yarns.

Repeat number three is Harry Harrison's **Wheelworld,** sequel to *Homeworld,* reviewed in February. I said then we could expect Harrison's hero, Jan Kulozik, to return from exile to save the world, but we don't have that yet. *Wheelworld* is the tale of Kulozik's efforts as engineer to save a colony set on a strange planet, habitable only near its poles and alternating four-year seasons of habitability even there. The colony is dedicated to raising food for Earth. Every four years the ships arrive to bring supplies and remove the food. As soon as they are gone, the colonists trek in giant trucks to the other pole to raise another crop. But one time the ships fail to arrive on time, and Kulozik

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must take command to get colonists and crop to safety. He succeeds, at great cost and peril, and the ships finally arrive. The explanation for the delay? Revolution! The colonies are free. Earth stands alone, and Kulozik can now take his struggle home. Yet home is with the colony he saved, and his struggle is now to improve its lot, not to liberate Earth from tyranny. He leaves the colony and his new wife to pursue *this* struggle, and volume three of the trilogy will pick up the story somewhere in space.

Kulozik is now a genuine hero, a man-who-can, not the passive pawn of *Homeworld*. What will he become in *Starworld?* Is there a trend here, a line of character development? Will his struggle take him back to Earth? Will my original prediction be fulfilled? Only time will tell. In the meantime, keep reading along. Harrison is as good a writer as ever, and you won't be disappointed. ■

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The Alternate View

MR. PRESIDENT

By J. E. Pournelle, Ph.D.

"Once to every man and nation
Comes the moment to decide."
James Russell Lowell,
Anglican Hymnal #519

Ask the average American the precise moment when he last felt really proud of the nation, and chances are high that he'll say "July 20, 1969, at about 4 P.M. Pacific Daylight Time." If he's like me he may wipe away a tear. I can still hear it. "Tranquility Base here. The Eagle has landed."

We could win back that lost pride—aye, and make a profit in the bargain.

Until a few years ago, the U.S. had positive balance of payments. Our largest export was high technology. Now our major export is agricultural products. . . .

We had technology for export because we invested in technology. The Space Program paid for itself ten times over. It's fashionable to denigrate the technology fallouts from space. NASA's most remarkable achievement may have been to make mankind's greatest achievement look dull. "Teflon frying pans," the scoffers say; but in the real world we got computers, firefighting methods, medical instruments, communications systems, techniques for fabricating large glass fibre structures, automated quality control procedures, and a host of other things now taken for granted. And perhaps the most important of all: a methodology for managing the most complex task in human history. Before Apollo, D-Day held that record.

Good high-technology research does not cost money. You always get your money back. Usually you make a large profit.

In 1871 France lay prostrate, as Bis-

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mark erected his new German Empire across the corpses of French dreams. It would be hard to exaggerate the depth of French despair. Then, in 1889, Alexandre-Gustav Eiffel built the tallest structure in the world; and France had pride again. The Eiffel tower wasn't useful, and at the time it certainly wasn't thought pretty; but nothing remotely like it had ever been done. Twice as high as St. Peter's or the Great Pyramid, built with almost contemptuous ease, it stood as a monument to the new France, and remained as the tallest building in the world until the completion of the Chrysler Building in 1930.

In 1981 the United States does not lie prostrate, but many citizens are demoralized because we have no sense of national purpose. The American people have too often been told there is no solution to the problems facing us; that we must share the misery and equitably distribute the poverty, because we can do nothing else.

This is nonsense; yet there is a grain of truth in the counsels of despair. So long as we live on Only One Earth, we must inevitably come to the time when our non-renewable resources are gone. In a small closed system such as a single planet, we may not agree on the limits to growth—but we all must admit there *are* limits.

The Earth is just too small and fragile a basket for the human race to keep all its eggs in. Some day we will lose the Earth. Probably not soon. Cosmic disasters are inevitable, but the chances that one will happen in any given century are fairly small. Over the long haul, though, we will lose the Earth: to a comet collision, or to the exploding Sun, or to a new Ice Age, or to any of a dozen other unlikely-sounding catastrophes. By that time we *must* be able to survive without Earth. History will bless the men and nation who took the first steps to give humanity a home other than "Only One Earth."

Last summer I took part in a high-level NASA mission study held at Pajaro Dunes. For a full week some of the most creative minds in the space community considered "bold new missions for the 25–50 year time frame." During the last two days, Administrator Robert Frosch took part.

I have recently been privileged to be among the first humans on Earth to see detailed pictures of Saturn. It was a thrilling experience. It also provided me an opportunity to confer with dozens of space experts from all over the nation. Following that, I called colleagues across the country. The question was simple enough: what are the best things we can do in space? What should be our goals, and what should we do this afternoon?

A surprising consensus emerged.

First: everyone agrees that the Halley Comet Intercept Mission is worthwhile. It is also *URGENT*. Unless some $20 million is put into the FY82 budget, there is no chance that the mission can fly. That $20 million buys an option to something unique in our lifetimes. It would be silly not to take that option; if later you decide the mission is not worthwhile, you can cancel it.

The balance of the space program will cost a lot more.

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1. It seems clear enough that we could have a Lunar colony within this century; and that such a colony could be made self-sustaining. There is disagreement over when we could send up the first colonists—would they be on the Moon before 1990—and, secondly, over when the colony could become self-sustained. (Basic supplies such as power and oxygen are plentiful on the Moon; but just how small can a closed ecology be?)

2. There is immense potential profit in space industries. At the moment, we know of no single space-made product that is sufficiently profitable to support not only its costs of manufacture, but also the "housekeeping" costs of a space station; but we do know of at least a dozen products which would be profitable if the basic space "industrial park" existed, so that the industry paid only its own costs.

If a space industrial facility existed, it would be profitable; and it would bring private enterprise into space.

3. Building a space industrial facility gives us experience in large orbital construction techniques. These skills are vital for both military and civilian space activities.

4. The industrial facility has been designed by large aerospace companies under the general title of "Space Operations Facility." This name has little power to inspire public acceptance. The president of one of the larger "Star Trek" clubs suggests "Starbase One."

Aerospace engineers closely associated with the project are agreed that construction of an operational space base is (given an operational shuttle) a three- to four-year task, but that the administrative and decision cycle of NASA as presently organized would add at least three years to that.

Starbase One could be minimally operational, with a crew aboard, by summer of 1984; and this can be accomplished without wasteful crash programs. This would require cooperation among aerospace companies.

Given intelligent management, there is no reason why Starbase One could not be sufficiently complete to allow on-site inspection by a high-ranking official in fall of 1984. Vice President Bush has been suggested.

5. Starbase One would provide support for civilian industries in space, but it is also a logical step toward construction of Lunar colonies. Indeed, once industries are well established in space, the laws of physics dictate that we go to the Moon as the most economical source of many raw materials including oxygen. Thus the space facility leads us toward a genuine escape from "Only One Earth"—but without committing us to any kind of Lunar timetable.

6. The Soviet Union is certain to have a very large space facility in operation by 1985; a facility much larger and probably more spectacular than the proposed Starbase. However, Starbase One gives us at least a chance of countering the inevitable Soviet claims to mastery of space (and to being the world's most powerful nation). Although one probably should not plan space missions solely to "beat the Russians," the psychological effects on our diplomacy cannot be ignored.

Starbase One is, of course, an Earth-observation facility which passes over the Soviet Union every two hours.

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7. Construction of Starbase One is compatible with completion of the Large Space Telescope by summer of 1984. The orbital telescope can provide photographs of Jupiter nearly as spectacular as those sent back by the Voyager spacecraft. It has big scientific utility combined with lots of color and flash and public appeal.

8. In addition to Starbase One, we should immediately open a program office for Solar Power Satellites. This ought to be funded at about $50 million a year.

The Solar Power Satellite (SPS) system is, like nuclear fusion, a "far-out" technology. Unlike fusion, SPS is known to work. It may not work economically, but it can't fail to produce electricity. Moreover, our best evidence to date is that SPS really is competitive with other systems. After all, coal requires some 5 billion tons a year—and we don't have the rail net to carry it. The sludges produced by stack gas scrubbers are *larger* than the original coal put into the boiler; disposal of all that cancerous stuff (stack-scrub sludge is really horrible goo) cannot be cheap.

SPS provides insurance against technological disaster. SPS *can* produce the electricity needed to run the country; it *may* be the cheapest way. Once we have the SPS option, we can *know* that our worst problems only cost money which we spend in our own country. We don't have to go to war or sell the nation on the installment plan.

If we want SPS later, it is cheaper to start now; crash funding is not only wasteful, but also detrimental. There is a maximum level a new start can absorb; after that, you're hiring anything that walks up the steps.

9. SPS requires capability for construction of large devices in orbit. Starbase One develops that capability. Starbase One contributes to the SPS option.

10. There are two routes to SPS. The NASA "standard" study spends some $25 billion (over 5–7 years) in research and development, then invests some $50–60 billion in a fleet of Heavy Lift Vehicles (HLV). Thus the first SPS power station costs some $100 billion dollars (and delivers about as much power as we presently get from Grand Coulee Dam). The next SPS will cost some $11 billion, since we would already have the Fleet of HLV and the R&D would be done.

The other route has been proposed by David Criswell, formerly of the Lunar and Planetary Institute (and winner of a Proxmire Golden Fleece due to his commendable zeal for protecting the lunar soil samples brought back by Apollo). Dr. Criswell believes we can build SPS with the shuttle, without the enormous investment in the HLV Fleet. His method envisions going to the Moon first and building SPS largely from Lunar materials.

Note that Starbase One is a highly desirable step toward building SPS on the Criswell plan; and that opening a $50 million per year program office for SPS will let us examine both the HLV and the Moon-first methods of building SPS.

11. The Pajaro Dunes misson planning study group produced excellent results. This group ought to be institutionalized: that is, an *outside* group composed in large part of people who

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are uninterested in NASA jobs, who get together at, say, semi-annual intervals. It should also have a semi-annual standing appointment with the NASA Administrator.

Such a group, to include engineers, scientists, science writers, and indeed science fiction dreamers, can do yeoman service at almost trivial costs.

You might even consider forming such a group to report yearly to you. If nothing else you'd find it stimulating.

In conclusion: nothing is cheap; but our only chance to improve productivity is to invest in new technology. It is the historic mission of government to build roads to new frontiers and protect early settlers. This is as true in 1981 as it was in 1781.

You have a unique opportunity.

(EDITOR'S NOTE TO ANALOG READERS: And so do you. If you agree with the ideas expressed here, you might do well to send copies of this essay—and your own letters—to the White House and Congress.) ■

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BRASS TACKS

Dear Mr. Schmidt,

Although the spaceship(s) in the story "Moment of Inertia," by Charles Sheffield, in the October 1980 issue seemed to be the product of hard science, its means of propulsion was surely pure fantasy.

Using the author's figures for the dimensions and density of the "dense disc," I got a tare mass for the ship of well over nine trillion tons. In the story a description of the propulsion system was kept simple by the author making brief references to a plasma drive, but not to its exhaust velocity. At the risk of erring on the optimistic side, I used the ultimate velocity, light speed, in my reckoning.

The *Dotterel* accelerated to 0.25c, decelerated to rest, and presumably did likewise on the return trip. I get an initial fuel mass requirement of over sixteen trillion tons! If this fuel is compressed to ultradensities, like the material of the sense disc, it could make another plate of the same thickness, but 133 meters in diameter. However, it would add considerably to the gravitational effects of the proper dense plate: three gees on the life support capsule at its furthest distance out along the central column. Mr. Sheffield could have used this idea of accommodating sixteen trillion tons of fuel if he'd had a 420-meter centre column instead of a 250-meter one. At normal densities the fuel would require a container of outrageous proportions.

Regardless of how the fuel is carried, the ship would devour its sixteen trillion tons supply at an average rate of over ten million tons per second!

As I mentioned before, Mr. Sheffield could have used an ultradense fuel mass if he'd had a longer central column on the ship; but I don't imagine he wanted us (readers) to dwell on such an enormous fuel requirement for too long, so he gave us a "magic" drive instead.

I'd hate to be accused of nitpicking, but the failure to mention such a vast fuel mass on Mr. Sheffield's part is I think, rather big for a mere nit.

LES JEPSON

Nottinghamshire, England

It's not a magic *drive, but it's sufficiently exotic that he didn't want to get into detail in that story—but he did in a later one. Please see Mr. Sheffield's reply to Mr. Depew, below, and his recent story, "All the Colors of the Vacuum."*

Dear Mr. Schmidt:

Re "Moment of Inertia" or Rescue Improbable: Taking into account your editorial in the October 1980 issue, I will try to marshall all the items in a reasonable order. To be brief, I do not see how the *Merganser* was ever saved from HC-183. On page 29 of the story Wenig finds that the *Merganser* . . . "Would be feeling a pull of fifty gees—their drive would be full on, as high as it's designed to go . . ."

Obviously, the *Merganser* was maneuvered, with the drive on at maximum (a no doubt neat trick), to a stable position within the gravitational field of HC-183. Now, I don't care how the life support section is freed (the solution in

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the story raises its own questions about the effect of fifty gee equivalent gravity on a liquid [in a vacuum—water??]), the ship cannot escape from its position since it is already going at full thrust. In fact, since the whole rescue exercise was designed to move the life support section away from the plate, the ship would have had to move away from HC-183 at less than full thrust or the original problem would have been re-introduced.

From all I can gather, using what was given in the story as a basis, the best the rescuers could do was move the *Merganser* a little closer to HC-183 (forty-eight gee thrust point?). I realize that as a reader I am supposed to suspend disbelief, but this is going a little far!

C. HENRY DEPEW

Tallahassee, FL

The author replies. . . .

Dear Mr. Depew,

There is a point of physics in the story that certainly needs further explanation, but it is not, I believe, any of the things that you mentioned. I'll come back to that, but first let me address your comments.

When Wenig or McAndrew discuss design limitations on the performance of *Merganser*, and quote a design limit of 50 gees, it ought to be obvious that they are certainly *not* referring to the ability of the propulsive system that accelerates the ship. For as Jeanie Roker says near the beginning (page 14), "We've got drives that will let us send probes out at better than a hundred gees . . . we're the weak link." Wenig and McAndrew are concerned with the new feature of the ship—the capability to make an acceleration of 50 gee feel like 1 gee to the human passengers. That's the "design limitation" of *Merganser* that they worry about—otherwise it would make no sense at all for McAndrew to say at the end of the story, "we'll have the next one up to a hundred gees." He's obviously talking about the neutralizing of acceleration by the gravity effects of a mass plate. The propulsive system can already accelerate a ship at a hundred gees and more, as Jeanie Roker's remark makes clear—but humans couldn't survive it.

The sequence of events for the rescue of *Merganser* would thus go, at an increased level of detail, as follows:

1) Switch off drive. McAndrew and Nina are now in a 50 gee field produced by the mass plate (for a fraction of a second). The ship is in free fall.

2) Hit *Merganser* from the side to jolt free the system that moves the life capsule away from the mass plate. (More on that in a moment, too.)

3) Begin to move the life capsule away from the mass plate.

4) Turn on the drive again.

Now, suppose that McAndrew has moved the life support capsule in 3) above to a distance from the mass plate where that plate produces a 49 gee gravitational acceleration (this is only a movement of one meter, which should take a fraction of a second). Then he sets the propulsion system to produce an acceleration of, say 51 gee. He will feel a net acceleration of 2 gee—tolerable to humans for at least long enough to attain a distance from HC-183 where he can cut the propulsion system acceleration to 50 gee and still keep moving away from HC-183 (net acceleration: 1 gee again). Then he can now reduce his propulsion system acceleration further and move the life support capsule gradually out from the mass plate. He's home free. If it stuck again, he'd have a problem—he'd have to repeat the op-

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eration a bit farther out, and *Dotterel* might begin to run out of things to throw at *Merganser*. But we assume that once the life support capsule starts moving away he can keep it going. You seem to assume that the *Merganser*'s limitations are those of the *propulsion system,* but it was made clear at the beginning of the story that this was never the limiting factor. We have 100 gees and more available for straight propulsive acceleration, but we have a 50 gee design limit *on our ability to neutralize accelerations*—a limit decided by the size of the mass plate. That was McAndrew's new development, not just a high gee drive—which they had already.

As for your concern about the effect of fifty gees on a liquid, the water would not experience 50 gees—it was *in free fall,* experiencing no gees at all. The only thing affecting it would be tidal forces, and they would have negligible effects in the short time between the water's departure from *Dotterel* and its arrival to impact *Merganser*. The water would leave and arrive as a compact volume. In vacuum? Certainly. Water is quite stable in a vacuum unless it is subjected to differential body forces to fragment it to smaller units. It might cool and solidify after a while, but not in the short time it took to go from one ship to the other.

Let me come to the physical objection to the story that does need explaining, and is explained in a sequel, "All The Colors Of The Vacuum." The effects of vacuum on people as well as materials (less than you might think) are also part of that story. The real problem with McAndrew's ship, or any ship that employs a 50 gee acceleration for a long period (many days) is that any propulsion system that satisfies conservation of energy and momentum must use up its reaction mass. Even if we assume a complete conversion of mass to radiation (a photon drive) and we refuse to allow "reactionless drives," we find that even this most efficient case would consume half the mass of the ship in reaction mass after four days of fifty gee continuous operation. McAndrew might get over that with some sort of ramscoop if he were travelling along in space, but not if he were hovering in one place near a star. How does McAndrew handle the problem of high acceleration without consuming ship's mass? I won't describe the plot of the sequel, except to say that he takes advantage of a genuine current inconsistency between quantum theory and general relativity, one that continues to disturb theorists.

Please keep writing—not enough people read science fiction stories with an eye on the science.

CHARLES SHEFFIELD

Dear Mr. Schmidt:

Regarding Jerry Pournelle's June "The Alternate View" and Mr. Charles Flink's comments in the September "Brass Tacks:" Both have some points in their favor, but miss some of the major problems of what's wrong with our military today. The Volunteer Army (VOLAR) didn't work mainly because the defense budget wasn't funded to make it work. The Navy and the Air Force are both voluntary services and have not been as short of recruits as the Army has been. What we need in the military is to stop the loss of the middle managers rather than wholesale increase in trainees, which is what the draft will provide. Admittedly it is easier to get a volunteer if they are facing being drafted, but if we are trying to eliminate discrimination in the workplace, why was it continued in this legislation?

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The problem with the military is primarily the compensation system and the undereducated recruits being produced by our school system. The school system has been discussed in the editorials as well as elsewhere, but the military compensation, other than as reported at budget time, is only really covered in the limited readership of military journals. In civilian life, if a wage hike were negotiated by a union, the contract would spell out where the money would be applied and how much. If the company could not afford it, it would probably go broke. Not so in the military. A congressionally approved pay raise may be allocated by the President to whatever areas he desires or he may "cap" it—disperse an amount less than approved. This is what has happened for the past several years. A review of the compensation system is long overdue, but will probably continue to be handled on a piecemeal basis until our armed forces are so deteriorated that the enemy (whichever one you prefer) will be on our doorstep and we will be wondering why we were left defenseless. It is expensive, the way things are now, to be patriotic and it becomes harder at each re-enlistment to commit yourself to this career. Not only do you have to put up with the normal military B.S., but you get sneered at in the press and on the street and forgotten by your government unless there is an election year. Isn't it sad that a married military member can qualify for welfare and food stamps in most states upon enlistment? I have a wife and three kids and just stopped getting these payments due to being promoted.

Mr. Pournelle and Mr. Flink, do your research a little better before you take a position which you may not be able to defend.

SHELDON I. ELLMAN, TSgt, USAF
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Dear Dr. Schmidt:

Jerry Pournelle is always stimulating and my A. I. (Agreement Index) is quite high. However in his article in June, "Twilight Song," my A. I. hit a low of about 40%, and that calls for a riposte. He stated "Over the next fifty years the world will undergo changes so dramatic as to make much of our history irrelevant . . . " It is his tense that bothers me. *That change has already taken place.* It is so momentous that he should not use the subjunctive later: " . . . whose cost would probably substantially delay the industrial exploitation of space." It has made space exploration and exploitation obsolete in the present context. Until we develop a better system, space and any defense other than MAD (Mutual Assured Deterrence), specifically including a conscript army, are luxuries the U.S. cannot afford. This will be so until the thinkers in the young generation forget fantasy and get back to engineering.

The fallacy with the conscript (or volunteer) army, a horde of Roman-type legions, is they must be just that—foot soldiers armed with swords and spears without logistic support. The U.S. cannot fuel a "modern" army. We *almost* ran out of petroleum in 1945. Dr. M.F. Coolbaugh, then president of Colorado School of Mines and an advisor of the War Production Board, told me that, at the rate of fuel consumption of the six months before Hitler was defeated, we could only have continued the two-front war for six more months. Fortunately, Germany ran out first.

I was in the intelligence organization which planned the invasion of Japan, the alternative to the A-bombs. We knew we were planning the greatest

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slaughter of humans the world was to have ever seen. We expected up to one million American casualties and that we might kill 20 million Japanese (these plans are discussed in detail in my forthcoming book, *Bloodstorm at Tsujido*). I felt immense relief when we learned in the afternoon of August 6, 1945, that a fantastic new weapon had been used at Hiroshima. The following morning, I studied two sets of aerial photographs of Hiroshima—before and after. I was both exhilarated and horror-stricken. It made war insanity, and Emperor Hirohito surrendered by radio. Tens of millions of lives had been saved. We, the American soldiers, would not have to go through the degradation of butchering those humans. Victory was obviously ours, and I, personally, had survived the war (something I had no assurance of on August 5).

Russia has stockpiled the equivalent of a roomful of TNT for every man, woman, and child in America: our own personal bombs. Even the most elaborate "defense" system we could devise could not prevent enough of this pent-up destruction from getting through to eliminate civilization. Of course the converse is also true. The medical profession has recently emphasized this (See *Science*, March 28, 1980, p. 1449). Even if we were to become total troglodytes, bankrupting the nation in the effort, survival in a nuclear war would not be possible. Therefore the U.S. has adopted the wisest of all policies toward nuclear war: make no preparations for civilian shelter.

The most elaborate econometric model of the whole world is in the CIA complex in Virginia. Among its studies are complete data on petroleum reserves. The model tells us that the Russians have enough petroleum to sustain a long war on the antiquated 1944 scale and, bluntly, that the U.S. and Europe do not. Further, if Russia grabs the Middle Eastern oil fields, she will have a steadily growing advantage for the rest of the century. This is what made President Carter's "human rights" philosophy such a disaster as policy. We needed the stability which the Shah gave to the Middle East, and "human rights" are in worse shape in Iran than before the Islamic revolution.

It is our lack of energy that has made military history irrelevant and makes a conscript army as worthless as France's vaunted Maginot Line. The U.S. can make only one contribution to the "defense" of Europe and that is to rattle our warheads. Oh, yes, we can keep a few divisions of garrison troops over there to signify our intention of support. Just how few division-months of warfare we could provide is a secret, at least from the civilian population; although the Russians surely have about the same number in their computers. As each year passes our disadvantage increases.

The internal combustion engine is obsolescent, and the longer we continue squandering our precious petrochemical resources on transportation, the grimmer our future will be. "Switch to coal," some say. That means increasing the CO_2 per unit of energy, intensifying the fossil fuel altithermal, which may mean melting of the continental ice sheets and flooding the lowest 50 meters of the continents where about half of the world's population lives. I agree with Jerry (in an earlier article) that relying on solar energy is like shooting elephants with a "B-B" gun—it won't scratch the surface, at least as far as present land-bound techniques are concerned.

Nuclear power is the cleanest, safest, most promising energy source for the next 50 years, which is probably why

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it is the most maligned by those determined to damage the U.S. economy. Ignorant but vociferous numbers tag after them, echoing their rant. It is these people who have given away our tremendous lead in nuclear power and effectively killed the space program.

So in my view the U.S. had no alternative to the atom, in war or peace. "Defense" is a word which no longer has meaning in the national sense. Digging into the ground or building up an antiquated land army will only compound the economic chaos which is piling up ahead of us. What I would like to see would be for Congress to offer a billion-dollar tax-free prize for the individual or organization that discovers and develops a major new energy source or an anti-gravity system which reduces energy requirements. There is nothing like old-fashioned avarice to stimulate the cranial perceptions of the thinking few. We have nothing to lose and everything to gain, including a possible place in space. If your readers would initiate a campaign of writing their Congressmen and Senators urging them to pass a prize program, the 21st century might see an effective space program. (They can also try to win the prize).

JAT WOLFE

MCC PO Box 1868
Makati, Metro Manila
Philippines

Dear Stan:

I seem to spend a disproportionate amount of time writing letters to you. That's all to the good. It means I'm getting the sort of interesting and provocative ideas I want to see in *Analog*.

Your editorial on crackpots touched a nerve, especially your reference to Christopher Columbus. The story that Columbus was called a crackpot because he thought the world was round is widely believed, but wrong. What's more, I think the reason it's not true has something to tell all psychoceramicists.

The learned men of the 15th century knew perfectly well the world was round. They had known it since classical times, when a Greek mathematician proved it with a rather elegant experiment. But that experiment also established the diameter of the Earth to within a few miles, and that is the point where Columbus and the savants parted company.

In order for the ships of the day to reach the Orient by sailing west, the Earth would have to have been a lot smaller than it is. Columbus claimed it was smaller and the learned men disagreed. Columbus and his crew would perish at sea, they said.

What the learned men did not know, and what Columbus may or may not have known, was that there was another continent between Europe and the Orient.

(It's entirely possible Columbus knew about the New World before he set out. He was an experienced sailor who had spent several years in the Azores and visited northern waters and there was evidence to be found in both places of land to the west. He may have claimed the Earth was smaller than he knew it to be to get support for his voyage without revealing his knowledge.)

The story of Columbus and the flat-earthers is an example of the sort of pseudo-conflict built into many stories of great inventions and discoveries.

We have a pattern we expect stories to fall into, and that pattern includes comprehensible conflict against nature or other people. The applicable version of the pattern was distilled and repeated endlessly by those movie biographies of the 1930s and 1940s that made all great men's lives sound alike.

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Boiled down, it is as follows:

Young Hero, through his own initiative and brilliance, experiences a satori and discovers Y. (Which can be anything from the theory of relativity to a new way to play the clarinet.) Eagerly he shows off his new discovery, but he is rejected by his contemporaries and scoffed at by the experts. Again and again he tries to convince them, forging ahead in the face of their blindness and stupidity. Obstacles are placed in his path by the establishment and public indifference, but still he perseveres. Then Young Hero gets the opportunity to make a crucial demonstration (experiment/concert/etc.) which will prove or disprove his work. The test is a success; Young Hero is vindicated and accepted by all right-thinking men and women.

Fade to credits.

That is enormously satisfying. Which is why Louis B. Mayer brought it to the screen again and again using everyone from Glen Miller to Louis Pasteur as the subject.

But it doesn't often happen that way. Actually there is very little conflict in science, even most great discoveries. If you go back and read the *contemporary* accounts of what actually went on, in context, you'll find there is almost always a lot less fuss and feathers than we imagine. The actual process of discovery, insight followed by painstaking and repetitive work to verify it, makes for boring reading in the hands of any but the most expert writer. The less-than-expert writer who is also a little intellectually dishonest is very likely to select those facts which fit into the emotionally satisfying movie-bio pattern and play them up. The result is another exciting bit of hagiography which unconsciously provides support for all the real crackpots out there.

Because so many stories have been shoehorned into this pattern and because we almost never hear of the cases where Our Hero fails because he is wrong, we tend to assume that anyone rejected by orthodoxy must have something going for them. This gives our bona fide crackpots a better name than most of them deserve and is usually used by them as evidence for their delusions of grandeur.

If anything, rejection by orthodox scientists establishes what my lawyer buddies would call a "rebuttable presumption" that the theory in question is incorrect.

RICK COOK

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Phoenix, AZ 85060

Sorry about the inaccuracy on Columbus, but I was so young then that my memory's a little rusty.

The effect you describe is very real, of course, and most of us are pretty vulnerable to it because we don't always have the chance to track down original sources. And it spreads into other fields, too. Composers of avant-garde music which symphony audiences stoically endure (please note: I'm defining a subclass) like to encourage the superstition that Great Composers Were Never Understood In Their Own Time, but it just ain't so. Most of them had to produce things people liked reasonably often or they'd find it hard to keep getting played. ■

● I find it both frightening and pathetic that when I give a talk or write a statement that reflects some optimism and hope for the future so many people respond so gratefully, almost as drowning men grasping at straws.

Glenn Seaborg

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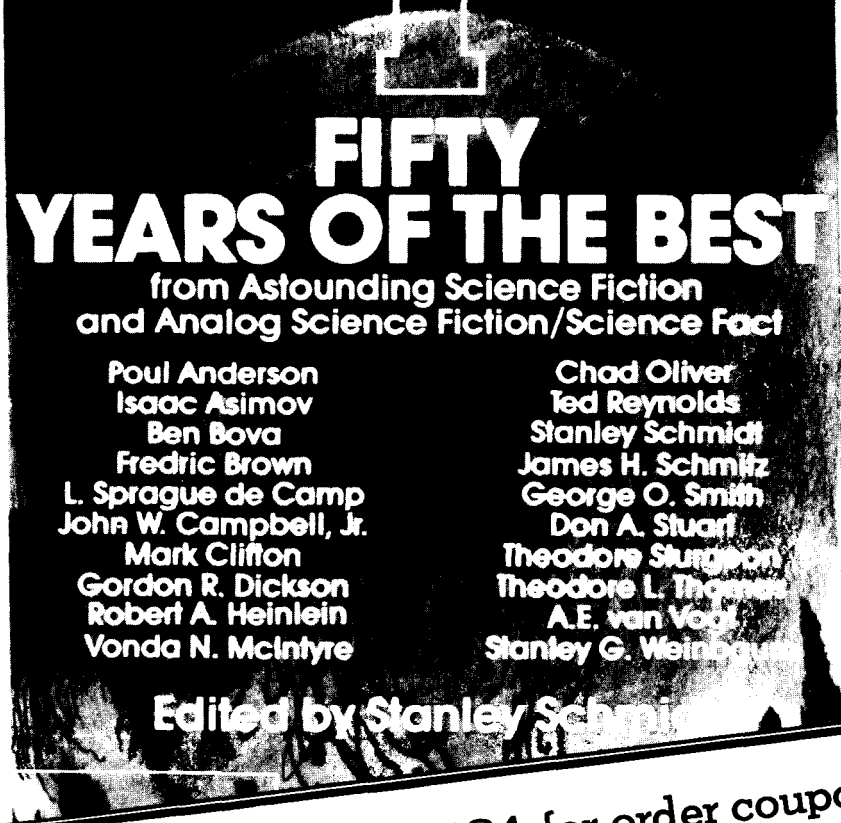

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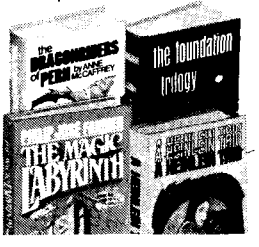

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